System x3400
Types 7973, 7974, 7975, and 7976

User's Guide

System x3400
Types 7973, 7974, 7975, and 7976

User's Guide

Note:

Before using this information and the product it supports, read the general information in “Notices,” on page 105, and the *Warranty and Support Information* document on the IBM *System x3400 Documentation* CD.

Fifth Edition (October 2008)

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Safety

Before installing this product, read the Safety Information.

قبل تركيب هذا المنتج، يجب قراءة الملاحظات الآمنية

Antes de instalar este produto, leia as Informações de Segurança.

在安装本产品之前，请仔细阅读 Safety Information
（安全信息）。

安裝本產品之前，請先閱讀「安全資訊」。

Prije instalacije ovog produkta obavezno pročitajte Sigurnosne Upute.

Před instalací tohoto produktu si přečtěte příručku bezpečnostních instrukcí.

Læs sikkerhedsforskrifterne, før du installerer dette produkt.

Lees voordat u dit product installeert eerst de veiligheidsvoorschriften.

Ennen kuin asennat tämän tuotteen, lue turvaohjeet kohdasta Safety Information.

Avant d'installer ce produit, lisez les consignes de sécurité.

Vor der Installation dieses Produkts die Sicherheitshinweise lesen.

Πριν εγκαταστήσετε το προϊόν αυτό, διαβάστε τις πληροφορίες ασφάλειας
(safety information).

לפני שתתקינו מוצר זה, קראו את הוראות הבטיחות.

A termék telepítése előtt olvassa el a Biztonsági előírásokat!

Prima di installare questo prodotto, leggere le Informazioni sulla Sicurezza.

製品の設置の前に、安全情報をお読みください。

본 제품을 설치하기 전에 안전 정보를 읽으십시오.

Пред да се инсталира овој продукт, прочитајте информацијата за безбедност.

Les sikkerhetsinformasjonen (Safety Information) før du installerer dette produktet.

Przed zainstalowaniem tego produktu, należy zapoznać się
z książką "Informacje dotyczące bezpieczeństwa" (Safety Information).

Antes de instalar este produto, leia as Informações sobre Segurança.

Перед установкой продукта прочтите инструкции по
технике безопасности.

Pred inštaláciou tohto zariadenia si pečítaje Bezpečnostné predpisy.

Pred namestitvijo tega proizvoda preberite Varnostne informacije.

Antes de instalar este producto, lea la información de seguridad.

Läs säkerhetsinformationen innan du installerar den här produkten.

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Important:

All caution and danger statements in this documentation begin with a number. This number is used to cross reference an English caution or danger statement with translated versions of the caution or danger statement in the *IBM Safety Information* book.

For example, if a caution statement begins with a number 1, translations for that caution statement appear in the *IBM Safety Information* book under statement 1.

Be sure to read all caution and danger statements in this documentation before performing the instructions. Read any additional safety information that comes with the blade server or optional device before you install the device.

Statement 1:

DANGER

Electrical current from power, telephone, and communication cables is hazardous.

To avoid a shock hazard:

- **Do not connect or disconnect any cables or perform installation, maintenance, or reconfiguration of this product during an electrical storm.**
- **Connect all power cords to a properly wired and grounded electrical outlet.**
- **Connect to properly wired outlets any equipment that will be attached to this product.**
- **When possible, use one hand only to connect or disconnect signal cables.**
- **Never turn on any equipment when there is evidence of fire, water, or structural damage.**
- **Disconnect the attached power cords, telecommunications systems, networks, and modems before you open the device covers, unless instructed otherwise in the installation and configuration procedures.**
- **Connect and disconnect cables as described in the following table when installing, moving, or opening covers on this product or attached devices.**

To Connect:	**To Disconnect:**
1. Turn everything OFF.	1. Turn everything OFF.
2. First, attach all cables to devices.	2. First, remove power cords from outlet.
3. Attach signal cables to connectors.	3. Remove signal cables from connectors.
4. Attach power cords to outlet.	4. Remove all cables from devices.
5. Turn device ON.	

Statement 2:

CAUTION:
When replacing the lithium battery, use only IBM Part Number 33F8354 or an equivalent type battery recommended by the manufacturer. If your system has a module containing a lithium battery, replace it only with the same module type made by the same manufacturer. The battery contains lithium and can explode if not properly used, handled, or disposed of.

Do not:

- **Throw or immerse into water**
- **Heat to more than 100°C (212°F)**
- **Repair or disassemble**

Dispose of the battery as required by local ordinances or regulations.

Statement 3:

CAUTION:
When laser products (such as CD-ROMs, DVD drives, fiber optic devices, or transmitters) are installed, note the following:

- **Do not remove the covers. Removing the covers of the laser product could result in exposure to hazardous laser radiation. There are no serviceable parts inside the device.**
- **Use of controls or adjustments or performance of procedures other than those specified herein might result in hazardous radiation exposure.**

DANGER

Some laser products contain an embedded Class 3A or Class 3B laser diode. Note the following.

Laser radiation when open. Do not stare into the beam, do not view directly with optical instruments, and avoid direct exposure to the beam.

Class 1 Laser Product
Laser Klasse 1
Laser Klass 1
Luokan 1 Laserlaite
Appareil À Laser de Classe 1

Statement 4:

≥ 18 kg (39.7 lb)

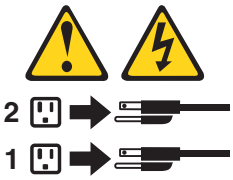
≥ 32 kg (70.5 lb)

≥ 55 kg (121.2 lb)

CAUTION:
Use safe practices when lifting.

Statement 5:

CAUTION:
The power control button on the device and the power switch on the power supply do not turn off the electrical current supplied to the device. The device also might have more than one power cord. To remove all electrical current from the device, ensure that all power cords are disconnected from the power source.



Statement 8:

CAUTION:
Never remove the cover on a power supply or any part that has the following label attached.

Hazardous voltage, current, and energy levels are present inside any component that has this label attached. There are no serviceable parts inside these components. If you suspect a problem with one of these parts, contact a service technician.

Statement 11:

CAUTION:
The following label indicates sharp edges, corners, or joints nearby.

Statement 12:

CAUTION:
The following label indicates a hot surface nearby.

Statement 13:

DANGER

Overloading a branch circuit is potentially a fire hazard and a shock hazard under certain conditions. To avoid these hazards, ensure that your system electrical requirements do not exceed branch circuit protection requirements. Refer to the information that is provided with your device for electrical specifications.

Statement 15:

CAUTION:
Make sure that the rack is secured properly to avoid tipping when the server unit is extended.

Statement 17:

CAUTION:
The following label indicates moving parts nearby.

WARNING: Handling the cord on this product or cords associated with accessories sold with this product, will expose you to lead, a chemical known to the State of California to cause cancer, and birth defects or other reproductive harm. ***Wash hands after handling.***

ADVERTENCIA: El contacto con el cable de este producto o con cables de accesorios que se venden junto con este producto, pueden exponerle al plomo, un elemento químico que en el estado de California de los Estados Unidos está considerado como un causante de cancer y de defectos congénitos, además de otros riesgos reproductivos. ***Lávese las manos después de usar el producto.***

This product is suitable for use on an IT power distribution system whose maximum phase to phase voltage is 240 V under any distribution fault condition.

Chapter 1. The System x3400 server

The IBM® System x3400 Types 7973, 7974, 7975, and 7976 is a 5-U-high, high-performance server that is based on IBM X-Architecture® technologies. It is ideally suited for networking environments that require superior microprocessor performance, improved systems management, and flexible memory and data management.

The server comes with a limited warranty. For information about the terms of the warranty and getting service and assistance, see the *Warranty and Support Information* document.

The server contains IBM Enterprise X-Architecture technologies, which help increase performance, reliability, and availability. For more information, see “What your server offers” on page 6 and “Reliability, availability, and serviceability” on page 7.

You can obtain up-to-date information about the server and other IBM server products at http://www.ibm.com/eserver/xseries/.

Related documentation

This *User's Guide* provides general information about the server, including how to install supported options and how to configure the server. The following documentation also comes with the server:

- *Installation Guide*
  This printed document contains instructions for setting up the server and basic instructions for installing some options.
- *Warranty and Support Information*

  This document is in Portable Document Format (PDF) on the IBM *System x3400 Documentation* CD. It contains information about the terms of the warranty and getting service and assistance.
- *Safety Information*
  This document is in PDF on the IBM *System x3400 Documentation* CD. It contains translated caution and danger statements. Each caution and danger statement that appears in the documentation has a number that you can use to locate the corresponding statement in your language in the *Safety Information* document.
- *Problem Determination and Service Guide*
  This document is in PDF on the IBM *System x3400 Documentation* CD. It contains information to help you solve problems yourself, and it contains information for service technicians.

Depending on the server model, additional documentation might be included on the IBM *System x3400 Documentation* CD.

The xSeries and System x™ Tools Center is an online information center that contains information about tools for updating, managing, and deploying firmware, device drivers, and operating systems. The xSeries Tools Center is at http://publib.boulder.ibm.com/infocenter/toolsctr/v1r0/index.jsp.

1. Racks are measured in vertical increments of 4.45 cm (1.75 inches) each. Each increment is called a ″U.″ A 1-U-high device is 1.75 inches tall.

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The server might have features that are not described in the documentation that comes with the server. The documentation might be updated occasionally to include information about those features, or technical updates might be available to provide additional information that is not included in the server documentation. These updates are available from the IBM Web site. To check for updated documentation and technical updates, complete the following steps.

Note: Changes are made periodically to the IBM Web site. The actual procedure might vary slightly from what is described in this document.

1. Go to http://www.ibm.com/support/.
2. Under **Search technical support**, type `System x3400`, and click **Search**.

Notices and statements in this document

The caution and danger statements that appear in this document are also in the multilingual *Safety Information* document, which is on the IBM *System x3400 Documentation* CD. Each statement is numbered for reference to the corresponding statement in the *Safety Information* document.

The following notices and statements are used in this document:

- **Note:** These notices provide important tips, guidance, or advice.
- **Important:** These notices provide information or advice that might help you avoid inconvenient or problem situations.
- **Attention:** These notices indicate potential damage to programs, devices, or data. An attention notice is placed just before the instruction or situation in which damage could occur.
- **Caution:** These statements indicate situations that can be potentially hazardous to you. A caution statement is placed just before the description of a potentially hazardous procedure step or situation.
- **Danger:** These statements indicate situations that can be potentially hazardous to you. A danger statement is placed just before the description of a potentially lethal or extremely hazardous procedure step or situation.

Machine Types 7973 and 7974 features and specifications

The following information is a high-level summary of the features and specifications for Machine Types 7973 and 7974. Depending on the server model, some features might not be available, or some specifications might not apply. See Chapter 2, “Installing options,” on page 17 for more detail information about the specifications and features and the installation of the components.

Table 1. Features and specifications

Microprocessor:
- Supports up to two Intel® Pentium® dual-core processors
- 4 MB shared Level-2 cache
- 667, 1066, or 1333 MHz front-side bus (FSB)

Note: Use the Configuration/Setup Utility program to determine the type and speed of the microprocessors.

Memory:
- Minimum: 1 GB
- Maximum: 32 GB (16 GB in mirrored mode)
- Types: PC2-5300, ECC fully-buffered with double-data-rate 2 (DDR2) SDRAM
- Connectors: eight dual inline memory module (DIMM) connectors, two-way interleaved

Drives (depending on the model):
- Diskette (optional): External USB diskette drive
- Hard disk drive: SATA
- One of the following IDE drives:
  - CD-ROM
  - CD-RW (optional)
  - DVD-ROM (optional)
  - DVD-ROM/CD-RW (optional)

Drive bays (depending on the model):
- Three half-high 5.25-in. bays (one CD or DVD drive installed) or one half-high CD or DVD drive and one full-high tape drive
- Four 3.5-in. simple-swap bays

Expansion slots (depending on the model):
- Six expansion slots
  - Three PCI Express x8 slots (two x8 links and one x4 link)
  - One PCI 32-bit/33 MHz slot
  - Two PCI-X 64-bit/133 MHz slots

Fans:
Three speed-controlled hot-swap fans

Power supply:
670 watt (90-240 V ac)

Size:
- Height: 440 mm (17.3 in.)
- Depth: 747 mm (29.4 in.)
- Width: 218 mm (8.6 in.)
- Weight: 20 kg (42 lb) to 34 kg (75 lb) depending upon configuration

Integrated functions:
- Baseboard management controller (BMC) or onboard service processor
- Broadcom 5721 10/100/1000 Ethernet controller on the system board with RJ-45 Ethernet port
- Six-port, Serial ATA controller
- Integrated RAID capability (SATA HostRAID)
- Remote Supervisor Adapter II SlimLine
- Two serial ports
- One parallel port
- Four Universal Serial Bus (USB) v2.0 ports (two on front and two on rear)
- Keyboard port
- Mouse port
- ATA-100 single-channel IDE controller (bus mastering)
- ATI ES1000 video controller
  - Compatible with SVGA and VGA
  - 16 MB SDRAM video memory

Diagnostic LEDs:
- Fans
- Memory
- Power supply

Acoustical noise emissions:
- Sound power, idling: 5.6 bel
- Sound power, operating: 6.0 bel

Environment:
- Air temperature:
  - Server on: 10° to 35°C (50° to 95°F) Altitude: 0 to 914 m (2998.0 ft)
  - Server off: -40° to 60°C (-40° to 140°F) Altitude: 0 to 2133 m (7000.0 ft)
- Humidity (operating and storage): 8% to 80%

Heat output:
Approximate heat output in British thermal units (Btu) per hour:
- Minimum configuration: 693 Btu per hour (203 watts)
- Maximum configuration: 1631 Btu per hour (478 watts)

Electrical input:
- Sine-wave input (50 or 60 Hz) required
- Input voltage and frequency ranges automatically selected
- Input voltage low range:
  - Minimum: 100 V ac
  - Maximum: 127 V ac
- Input voltage high range:
  - Minimum: 200 V ac
  - Maximum: 240 V ac
- Input kilovolt-amperes (kVA) approximately:
  - Minimum: 0.21 kVA (all models)
  - Maximum: 0.49 kVA

Notes:
1. Power consumption and heat output vary depending on the number and type of optional features installed and the power-management optional features in use.
2. These levels were measured in controlled acoustical environments according to the procedures specified by the American National Standards Institute (ANSI) S12.10 and ISO 7779 and are reported in accordance with ISO 9296. Actual sound-pressure levels in a given location might exceed the average values stated because of room reflections and other nearby noise sources. The declared sound-power levels indicate an upper limit, below which a large number of computers will operate.

Machine Types 7975 and 7976 features and specifications

The following information is a summary of the features and specifications for Machine Types 7975 and 7976. Depending on the server model, some features might not be available, or some specifications might not apply. See Chapter 2, “Installing options,” on page 17 for more detail information about the specifications and features and the installation of the components.

Table 2. Features and specifications

Microprocessor:
- Supports up to two Intel® Xeon dual-core processors or two Intel quad-core processors.

  Important: Do not mix dual-core and quad-core processors in the same system.
- 4 MB shared Level-2 cache
- 667, 1066, or 1333 MHz front-side bus (FSB)

Note: Use the Configuration/Setup Utility program to determine the type and speed of the microprocessors.

Memory:
- Minimum: 1 GB
- Maximum: 32 GB (16 GB in mirrored mode)
- Types: PC2-5300, ECC fully-buffered with double-data-rate 2 (DDR2) SDRAM
- Connectors: eight dual inline memory module (DIMM) connectors, two-way interleaved

Drives (depending on the model):
- Diskette (optional): External USB diskette drive
- Hard disk drive: SATA or SAS
- One of the following IDE drives:
  - CD-ROM
  - CD-RW (optional)
  - DVD-ROM (optional)
  - DVD-ROM/CD-RW (optional)

Drive bays (depending on the model):
- Three half-high 5.25-in. bays (one CD or DVD drive installed) or one half-high CD or DVD and one full-high tape drive
- Eight 3.5-in. hot-swap hard disk drive bays

  Note: You can install up to eight hot-swap drives when you order the 4-drive backplane option kit.

Expansion slots (depending on the model):
- Six expansion slots
  - Three PCI Express x8 slots (two x8 links and one x4 link)
  - One PCI 32-bit/33 MHz slot
  - Two PCI-X 64-bit/133 MHz slots

Fans: Three speed-controlled hot-swap fans (standard)
Note: Six fans are required to provide redundancy in hot-swap models; therefore, you must install an additional redundant power and cooling option kit (the option kit comes with a hot-swap power supply and three hot-swap fans) to upgrade to redundant mode.

Power supply:
One of the following power supplies:
- One nonredundant 670 watt (90-240 V ac)
- One 835 watt (90-240 V ac).
  Note: Two 835-watt power supplies provide redundancy in hot-swap models; therefore, you must install an additional redundant power and cooling option kit (the option kit comes with an 835-watt hot-swap power supply and three hot-swap fans) to upgrade to redundant mode.

Size:
- Height: 440 mm (17.3 in.)
- Depth: 747 mm (29.4 in.)
- Width: 218 mm (8.6 in.)
- Weight: 20 kg (42 lb) to 34 kg (75 lb) depending upon configuration

Integrated functions:
- Baseboard management controller (BMC) or onboard service processor
- Broadcom 5721 10/100/1000 Ethernet controller on the system board with RJ-45 Ethernet port
- Dual-channel (four ports per channel) onboard SAS/SATA controller
- Remote Supervisor Adapter II SlimLine
- Two serial ports
- One parallel port
- Four Universal Serial Bus (USB) v2.0 ports (two on front and two on rear)
- Keyboard port
- Mouse port
- ATA-100 single-channel IDE controller (bus mastering)
- ATI ES1000 video controller
  - Compatible with SVGA and VGA
  - 16 MB SDRAM video memory

Acoustical noise emissions (depending on your model):
- Sound power, idling: 5.6 bel or 6.0 bel
- Sound power, operating: 6.0 bel or 6.1 bel

Diagnostic LEDs:
- Fans
- Memory
- Hard disk drives (redundant models)
- Power supply

Environment:
- Air temperature:
  - Server on: 10° to 35°C (50° to 95°F) Altitude: 0 to 914 m (2998.0 ft)
  - Server off: -40° to 60°C (-40° to 140°F) Altitude: 0 to 2133 m (7000.0 ft)
- Humidity (operating and storage): 8% to 80%

Heat output:
Approximate heat output in British thermal units (Btu) per hour:
- Minimum configuration: 781 Btu per hour (229 watts)
- Maximum configuration: 1910 Btu per hour (560 watts)

Electrical input:
- Sine-wave input (50 or 60 Hz) required
- Input voltage and frequency ranges automatically selected
- Input voltage low range:
  - Minimum: 100 V ac
  - Maximum: 127 V ac
- Input voltage high range:
  - Minimum: 200 V ac
  - Maximum: 240 V ac
- Input kilovolt-amperes (kVA) approximately:
  - Minimum: 0.23 kVA (all models)
  - Maximum: 0.57 kVA

Notes:
1. Power consumption and heat output vary depending on the number and type of optional features installed and the power-management optional features in use.
2. These levels were measured in controlled acoustical environments according to the procedures specified by the American National Standards Institute (ANSI) S12.10 and ISO 7779 and are reported in accordance with ISO 9296. Actual sound-pressure levels in a given location might exceed the average values stated because of room reflections and other nearby noise sources. The declared sound-power levels indicate an upper limit, below which a large number of computers will operate.

What your server offers

The server uses the following features and technologies:

- **Baseboard management controller (BMC)**

  The BMC provides basic service-processor environmental monitoring functions. If an environmental condition exceeds a threshold or if a system component fails, the BMC provides LEDs to help you diagnose the problem.

- **High-performance graphics controller**

  The server comes with an onboard high-performance graphics controller that supports high resolutions and includes many performance-enhancing features for the operating-system environment.

- ***IBM Enhanced Diagnostics CD***

  The server comes with an *IBM Enhanced Diagnostics* CD, which you can use to diagnose problems.

- **IBM Director**

  IBM Director is a workgroup-hardware-management tool that you can use to centrally manage System x3400 servers. For more information, see the IBM Director documentation on the *IBM Director* CD.

- **IBM Enterprise X-Architecture technology**

  IBM X-Architecture technology combines proven, innovative IBM designs to make your Intel-processor-based server powerful, scalable, and reliable. For more information, see http://www.ibm.com/servers/eserver/xseries/xarchitecture/enterprise/index.html.

- **IBM *ServerGuide Setup and Installation CD***

  The *ServerGuide Setup and Installation* CD provides programs to help you set up the server (some models) and install an operating system. The ServerGuide™ program detects installed hardware options and provides the correct configuration programs and device drivers.

  For more information about the *ServerGuide Setup and Installation* CD, see “Using the ServerGuide Setup and Installation CD” on page 81.

- **Integrated network support**

  The server comes with an integrated Broadcom NetXtreme Gigabit Ethernet controller, which supports connection to a 10-Mbps, 100-Mbps, or 1000-Mbps network. For more information, see “Configuring the Broadcom Gigabit Ethernet controller” on page 83.

- **Large data-storage capacity and hot-swap capabilities**

  Hot-swap models support up to eight slim-high, 3.5-inch hot-swap hard disk drives in the hot-swap bays. With the hot-swap feature, you can add, remove, or replace hard disk drives without turning off the server.

- **Large system-memory capacity**

  The server supports up to 32 GB (reduced to 16 GB in mirrored mode) of system memory. The memory controller supports error correcting code (ECC) for up to eight industry-standard, 2-way interleaved, x4 or x8, 1.8 V, 240-pin, double-data-rate 2 (DDR2), PC2-5300, 677 MHz, dynamic random-access memory (DRAM) fully buffered (FBD) dual inline memory modules (DIMMs).

- **Memory mirroring**

  Some models support memory mirroring. Memory mirroring replicates and stores data in DIMMs within two branches simultaneously. To support memory mirroring, you must have at least two pairs of DIMMs installed (a pair in each branch). Pairs of DIMMs that are next to each other (for example, DIMM slot 1 and DIMM slot 4) within the channels of the same branch must be identical pairs of

full-buffered, dual inline memory modules (DIMMs). For more information, see “Installing a memory module” on page 28.

- **Online-spare memory**

  Some models support online-sparing memory. Online-spare memory disables a failed rank pair of DIMMs from the system configuration and activates an online-spare rank pair of DIMMs to replace the failed rank pair of DIMMs. For an online-spare pair of DIMMs to be activated, you must enable this feature and have installed an additional pair of DIMMs of the same speed, type, size (or larger), and technology as the failed pair of DIMMs. For more information, see “Installing a memory module” on page 28.

- **Redundant power capabilities**

  Some models supports up to two 835-watt power supplies, which provide redundancy and hot-swap capability for a typical configuration. If the maximum load on the server is less than 835 watts and a problem occurs with one of the power supplies, the other power supply can meet the power requirements.

- **ServeRAID™ support**

  Some models support ServeRAID adapters to create redundant array of independent disks (RAID) configurations. Some models also have integrated RAID level-0 and level-1 support.

- **Symmetric multiprocessing (SMP)**

  The server supports up to two Intel Xeon microprocessors. Each microprocessor provides symmetric multiprocessing capability. When you install the second microprocessor, this will enhance the performance of the server.

- **Systems-management capabilities**

  The server supports an optional Remote Supervisor Adapter II SlimLine, which provides service-processor functions in addition to those that the BMC provides. When this adapter is used with the systems-management software that comes with the server, you can manage the functions of the server locally and remotely. The Remote Supervisor Adapter II SlimLine also provides system monitoring, event recording, and dial-out alert capability.

  See the documentation that comes with your systems-management software for more information. To order an optional Remote Supervisor Adapter II SlimLine, contact your IBM marketing representative or authorized reseller.

Reliability, availability, and serviceability

Three important server design features are reliability, availability, and serviceability (RAS). The RAS features help to ensure the integrity of the data that is stored in the server, the availability of the server when you need it, and the ease with which you can diagnose and repair problems.

The server might have the following RAS features (the features vary depending on your model):

- 1-year parts and 1-year labor limited warranty (Machine Types 7973 and 7975) and 3-year parts and 3-year labor limited warranty (Machine Types 7974 and 7976)
- Advanced Configuration and Power Interface (ACPI)
- Advanced Desktop Management Interface (DMI) features
- Automatic error retry or recovery
- Automatic memory downsizing on error detection
- Automatic restart on nonmaskable interrupt (NMI)

- Automatic Server Restart (ASR) logic supporting a system restart when the operating system becomes unresponsive
- Automatic server restart after a power failure, based on the BIOS setting
- Availability of microcode level
- Boot-block recovery
- Built-in, menu-driven setup, system configuration, and redundant array of independent disks (RAID) configuration
- Built-in monitoring for fan, power, temperature, and voltage
- CD-based diagnostic programs
- Cooling fans with speed-sensing capability
- Customer support center that is available 24 hours a day, 7 days a week[2]
- Diagnostic support of ServeRAID adapters
- Error codes and messages
- Error correcting code (ECC) double-data-rate 2 (DDR2) synchronous dynamic random-access memory (SDRAM) with serial presence detect (SPD)
- Error logging of POST failures
- Hot-swap Serial Attached SCSI (SAS) and hot-swap Serial ATA (SATA) hard disk drives
- Integrated Ethernet controller
- Support for an optional IBM Remote Supervisor Adapter II SlimLine
- Key-lock support for physical security
- Memory change messages posted to the error log
- Baseboard management controller (BMC) or service processor
- Power management
- Power-on self-test (POST)
- Read-only memory (ROM) checksums
- Redundant Ethernet capabilities (requires an optional Ethernet adapter) with failover support
- Simple-swap Serial Advanced Technology Attachment (SATA) hard disk drives
- Standby voltage for system-management features and monitoring
- System auto-configuring from the configuration menu
- System-error LED on the front bezel and diagnostic LEDs on the system board
- Upgradeable baseboard management controller (BMC) firmware
- Upgradeable microcode for POST, basic input/output system (BIOS) code, and read-only memory (ROM) resident code, locally or over a LAN
- Vital product data (VPD); includes serial-number information and replacement part numbers, stored in nonvolatile memory, for easier remote maintenance
- Wake on LAN® capability

IBM Director

With IBM Director, a network administrator can perform the following tasks:

- View the hardware configuration of remote systems, in detail
- Monitor the usage and performance of critical components, such as microprocessors, disks, and memory

2. Service availability will vary by country. Response time varies; may exclude holidays.

- Centrally manage individual or large groups of IBM and non-IBM Intel-processor-based servers, desktop computers, workstations, and mobile computers on a variety of platforms

IBM Director provides a comprehensive entry-level workgroup hardware manager. It includes the following key features:

- Advanced self-management capabilities for maximum system availability.
- Multiple operating-system platform support, including Microsoft® Windows® 2000 Server, Windows Server 2003, Windows XP Professional, AIX, i5/OS, Red Hat Linux®, SUSE Linux, VMware, and Novell NetWare. For a complete list of operating systems that support IBM Director, see the IBM Director Compatibility Document. This document is in Portable Document Format (PDF) at http://www.ibm.com/pc/support/site.wss/document.do?lndocid=MIGR-61788. It is updated every 6 to 8 weeks.
- Support for IBM and non-IBM servers, desktop computers, workstations, and mobile computers.
- Support for systems-management industry standards.
- Integration into leading workgroup and enterprise systems-management environments.
- Ease of use, training, and setup.

IBM Director also provides an extensible platform that supports advanced server tools that are designed to reduce the total cost of managing and supporting networked systems. By deploying IBM Director, you can achieve reductions in ownership costs through the following benefits:

- Reduced downtime
- Increased productivity of IT personnel and users
- Reduced service and support costs

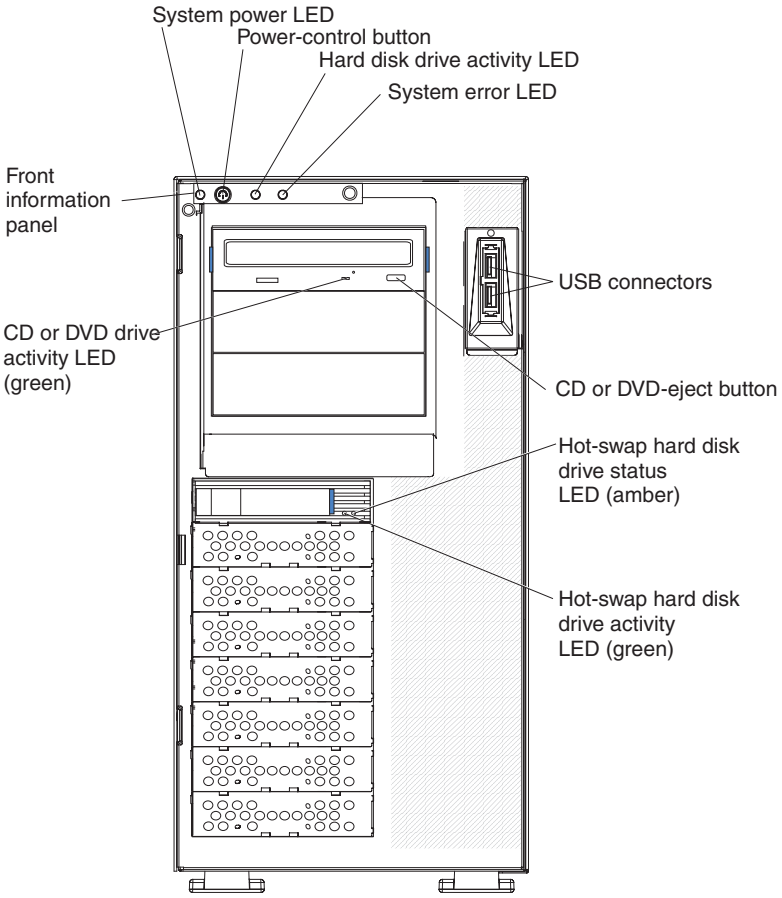
For more information about IBM Director, see the documentation on the IBM Director CD that comes with the server, the IBM Director Information Center at http://publib.boulder.ibm.com/infocenter/eserver/v1r2/topic/diricinfo/fqm0_main.html, and the IBM xSeries Systems Management Web page at http://www.ibm.com/servers/eserver/xseries/systems_management/, which presents an overview of IBM Systems Management and IBM Director.

Server controls, LEDs, and power

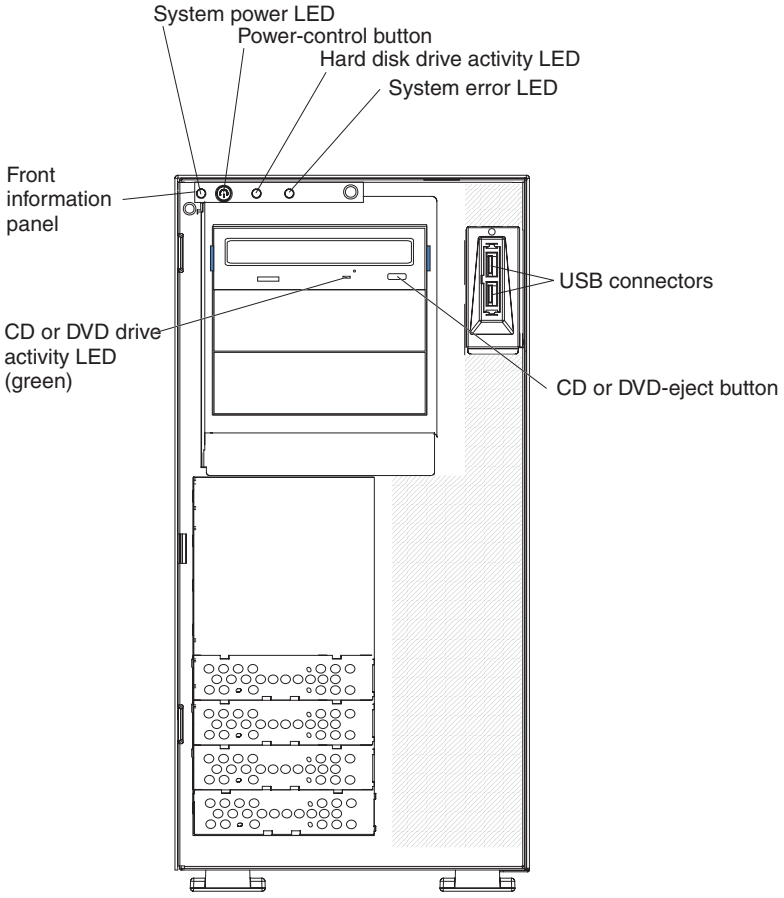
This section describes the controls and light-emitting diodes (LEDs) and how to turn the server on and off.

Front view

The following illustration shows the controls, LEDs, and connectors on the front of the hot-swap server models.


System power LED
Power-control button
Hard disk drive activity LED
System error LED
Front information panel
USB connectors
CD or DVD drive activity LED (green)
CD or DVD-eject button
Hot-swap hard disk drive status LED (amber)
Hot-swap hard disk drive activity LED (green)

The following illustration shows the controls, LEDs, and connectors on the front of the simple-swap server models.



Power-on LED

When this LED is lit, it indicates that the server is turned on. When this LED is flashing, it indicates that the system is turned off and but still connected to ac power. When this LED is off, it indicates that ac power is not present, or the power supply or the LED itself has failed.

Power-control button

Press this button to turn the server on and off manually.

Hard disk drive activity LED

When this LED is flashing rapidly, it indicates that a hard disk drive is in use.

System-error LED

When this amber LED is lit, it indicates that a system error has occurred. An LED on the system board might also be lit to help isolate the error. Detailed troubleshooting information is in the *Problem Determination and Service Guide* on the IBM *System x3400 Documentation* CD.

USB connectors

Connect USB devices to these connectors.

CD-eject or DVD-eject button

Press this button to release a CD from the CD drive or a DVD from the DVD drive.

CD or DVD drive activity LED

When this LED is lit, it indicates that the CD drive or DVD drive is in use.

Hot-swap hard disk drive activity LED (some models)

On some server models, each hot-swap drive has a hard disk drive activity LED. When this green LED is flashing, it indicates that the associated hard disk drive is in use.

When the drive is removed, this LED also is visible on the SAS/SATA backplane, next to the drive connector. The backplane is the printed circuit board behind drive bays 4 through 7.

Hot-swap hard disk drive status LED (some models)

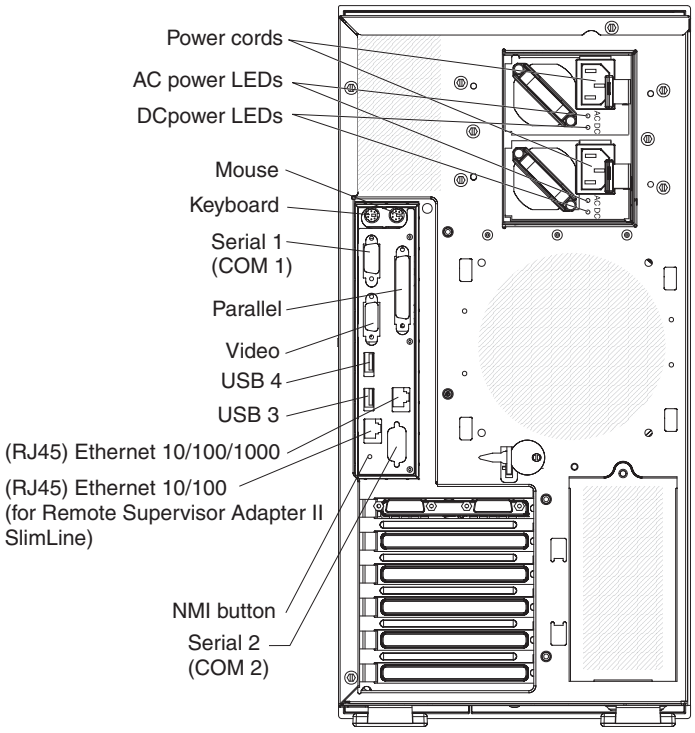
On some server models, each hot-swap hard disk drive has an amber status LED. If this amber status LED is lit, it indicates that the associated hard disk drive has failed.

If an optional ServeRAID adapter is installed in the server and the LED flashes slowly (one flash per second), the drive is being rebuilt. If the LED flashes rapidly (three flashes per second), the adapter is identifying the drive.

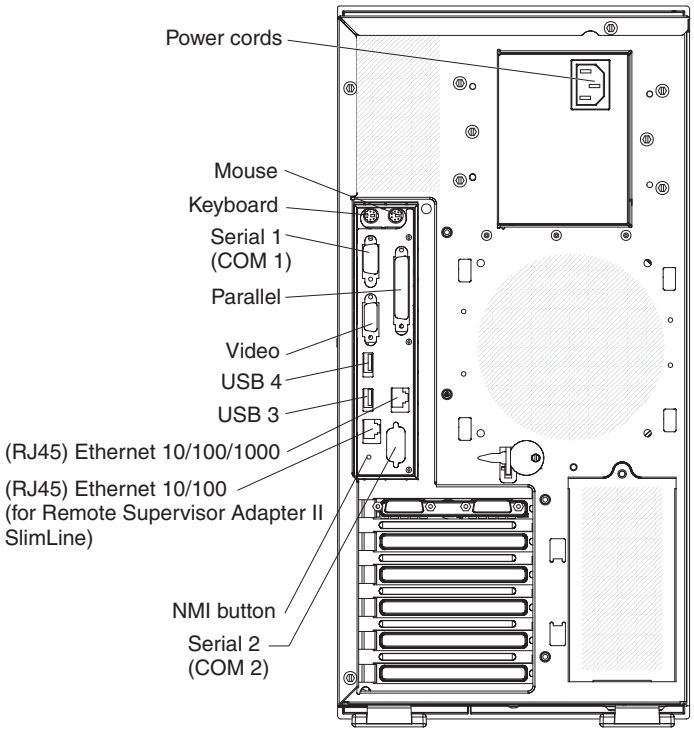
When the drive is removed, this LED also is visible on the SAS/SATA backplane, below the hot-swap hard disk drive activity LED.

Rear view

The following illustration shows the LEDs and connectors on the rear of the hot-swap power supply models with optional redundant power. For more information about these connectors, see “Server components” on page 17.



The following illustration shows the connectors on the rear of the non-hot-swap power supply models. For more information about these connectors, see “Server components” on page 17.



Power-cord connector
Connect the power cord to this connector.

Mouse connector
Connect a mouse device to this connector.

Keyboard connector
Connect a PS/2 keyboard to this connector.

Serial 1 connector
Connect a 9-pin serial device to this connector.

Parallel connector
Connect a parallel device to this connector.

Video connector
Connect a monitor to this connector.

USB connectors
Connect USB devices to these connectors.

Ethernet connector
Use this connector to connect the server to a network.

Serial 2 connector
Connect a 9-pin serial device to this connector.

Ethernet transmit/receive activity LED
This LED is on the Ethernet connector on the rear of the server. When this LED is lit, it indicates that there is activity between the server and the network.

Ethernet link status LED
This LED is on the Ethernet connector on the rear of the server. When this LED is lit, it indicates that there is an active connection on the Ethernet port.

Server power features

When the server is connected to an ac power source but is not turned on, the operating system does not run, and all core logic except for the service processor (the baseboard management controller (BMC) or optional Remote Supervisor Adapter II SlimLine) is shut down; however, the server can respond to remote requests from the service processor, such as a remote request to turn on the server. The power-on LED flashes to indicate that the server is connected to ac power but not turned on.

Turning on the server

Approximately 20 seconds after the server is connected to ac power, the power-control button becomes active, and one or more fans (some models) might start running to provide cooling while the server is connected to power. You can turn on the server and start the operating system by pressing the power-control button.

The server can also be turned on in any of the following ways:

- If a power failure occurs while the server is turned on, the server will restart automatically when power is restored.
- If your operating system supports the systems-management software for an optional Remote Supervisor Adapter II SlimLine, the systems-management software can turn on the server.
- If your operating system supports the Wake on LAN feature, the Wake on LAN feature can turn on the server.
- If an optional Remote Supervisor Adapter II SlimLine is installed in the server, the server can be turned on from the Remote Supervisor Adapter II SlimLine user interface.

Note: When 4 GB or more of memory (physical or logical) is installed, some memory is reserved for various system resources and is unavailable to the operating system. The amount of memory that is reserved for system resources depends on the operating system, the configuration of the server, and the configured peripheral component interconnect (PCI, PCI Express, or PCI-X) options.

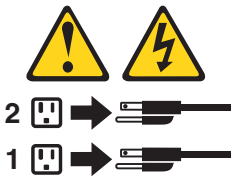
Turning off the server

When you turn off the server and leave it connected to ac power, the server can respond to remote requests to turn on the server. While the server remains connected to ac power, one or more fans (some models) might continue to run. To remove all power from the server, you must disconnect it from the power source.

Some operating systems require an orderly shutdown before you turn off the server. See your operating-system documentation for information about shutting down the operating system.

Statement 5:

CAUTION:
The power control button on the device and the power switch on the power supply do not turn off the electrical current supplied to the device. The device also might have more than one power cord. To remove all electrical current from the device, ensure that all power cords are disconnected from the power source.



The server can be turned off in any of the following ways:

- You can turn off the server from the operating system, if your operating system supports this feature. After an orderly shutdown of the operating system, the server will be turned off automatically.
- You can press the power-control button to start an orderly shutdown of the operating system and turn off the server, if your operating system supports this feature.
- If the operating system stops functioning, you can press and hold the power-control button for more than 4 seconds to turn off the server.
- If an optional Remote Supervisor Adapter II SlimLine is installed in the server, the server can be turned off from the Remote Supervisor Adapter II SlimLine user interface.
- The server can turn itself off as an automatic response to a critical system failure.

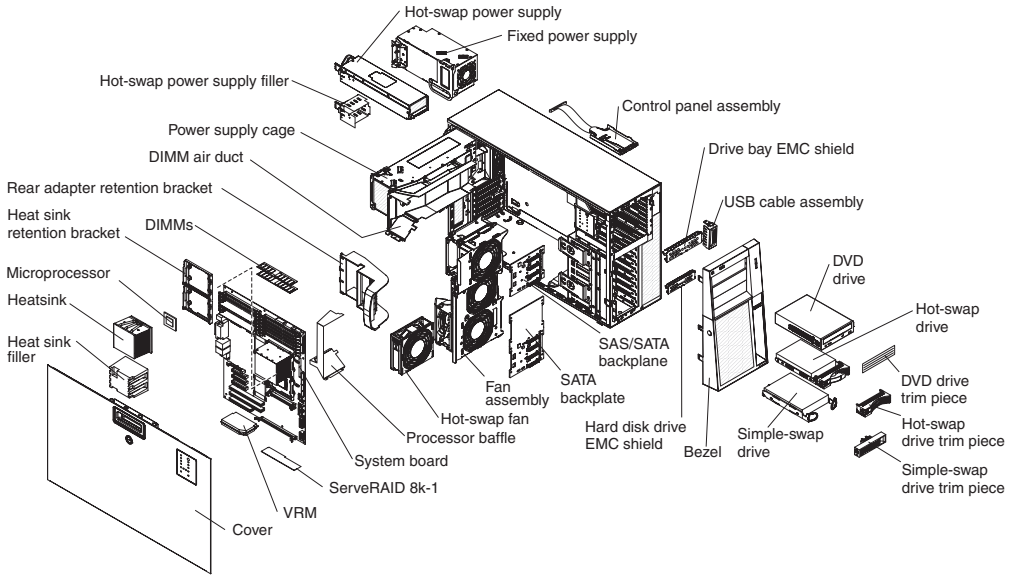
Chapter 2. Installing options

Important: Before you install optional hardware, make sure that the server is working correctly. Start the server, and make sure that the operating system starts, if an operating system is installed, or that a 19990305 error code is displayed, indicating that an operating system was not found but the server is otherwise working correctly. If the server is not working correctly, see the *Problem Determination and Service Guide* for diagnostic information.

This chapter provides detailed instructions for installing optional hardware devices in the server.

Server components

The following illustration shows the major components in the server (depending on the server model). The illustrations in this document might differ slightly from your hardware.



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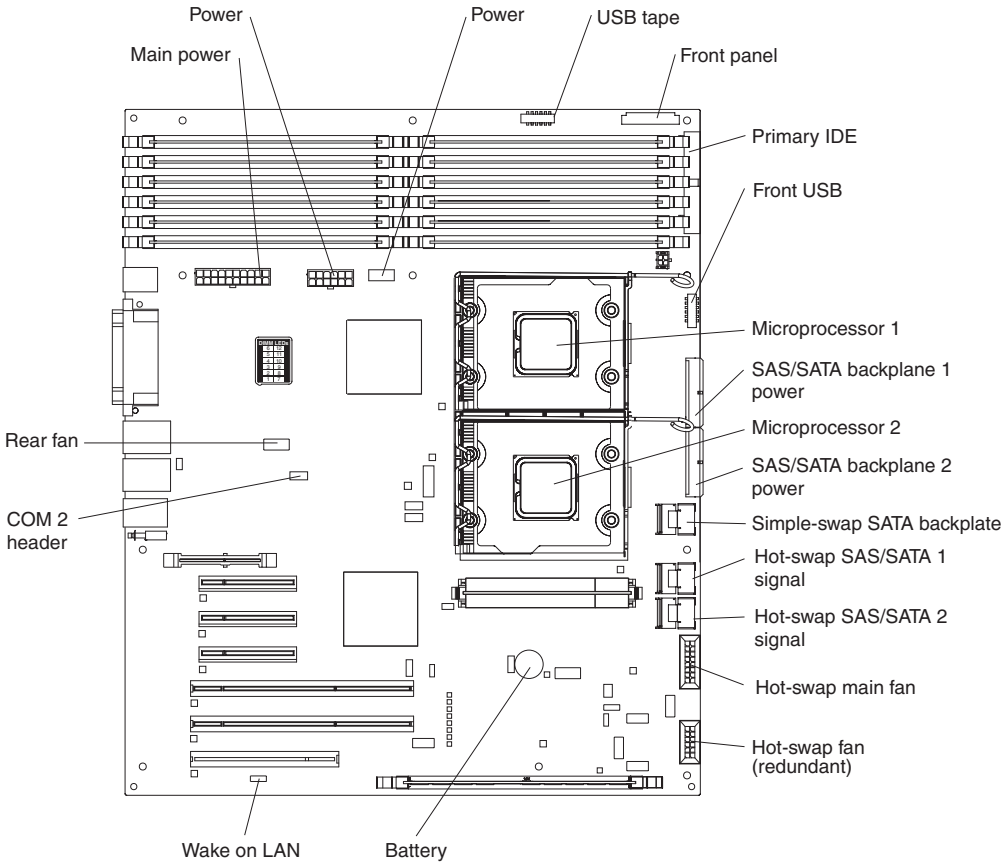
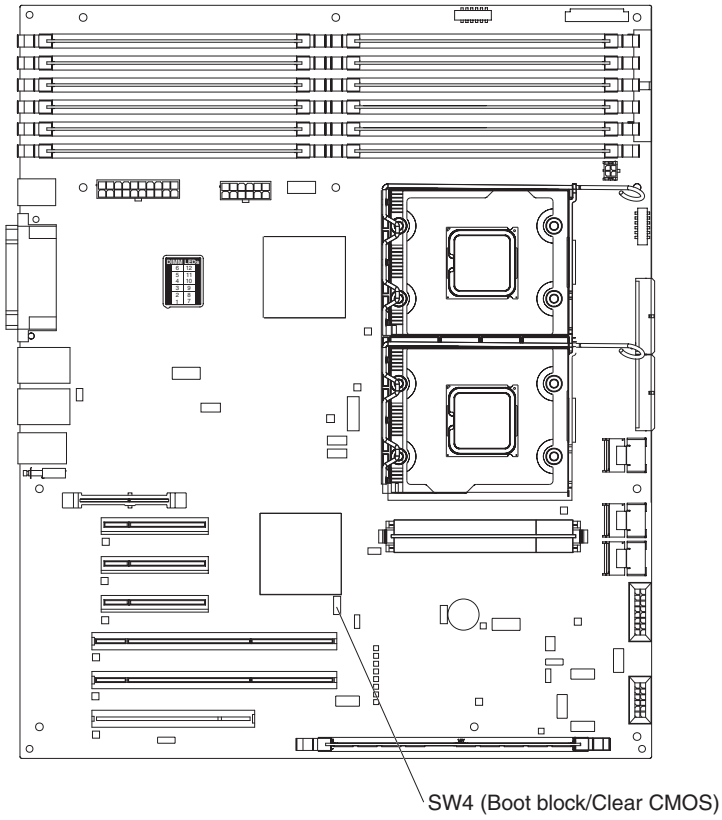
System-board internal connectors

The following illustration shows the internal connectors on the system board.



System-board switches

The following illustration shows the SW4 switch (Boot block/Clear CMOS) on the system board.



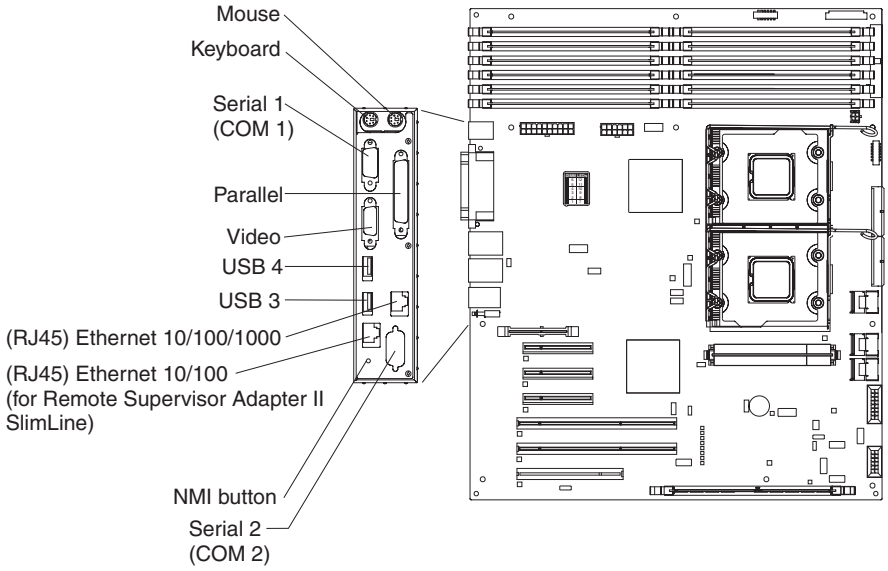
The following table describes the function of each pin on the SW4 switch (Boot block/Clear CMOS) on the system board.

Table 3. System board SW4 switch

Switch pin number	Description
1	Boot block: • When this switch is on **1**, this is normal mode. • When this switch is toggled to **On**, this enables the system to recover if the BIOS code becomes damaged. See the *Problem Determination and Service Guide* for information about recovering from a BIOS update failure.
2	Clear CMOS: • When this switch is on **2**, this is normal mode. This keeps the CMOS data. • When this switch is toggled to **On**, this clears the CMOS data, which clears the power-on password and administrator password.

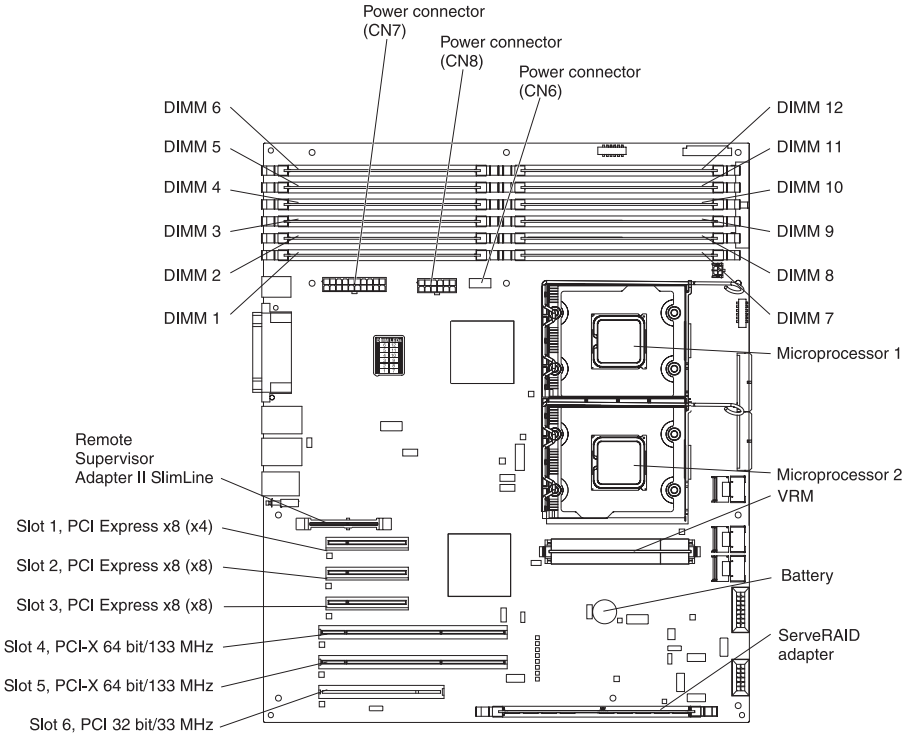
System-board external connectors

The following illustration shows the external input/output (I/O) connectors on the system board.



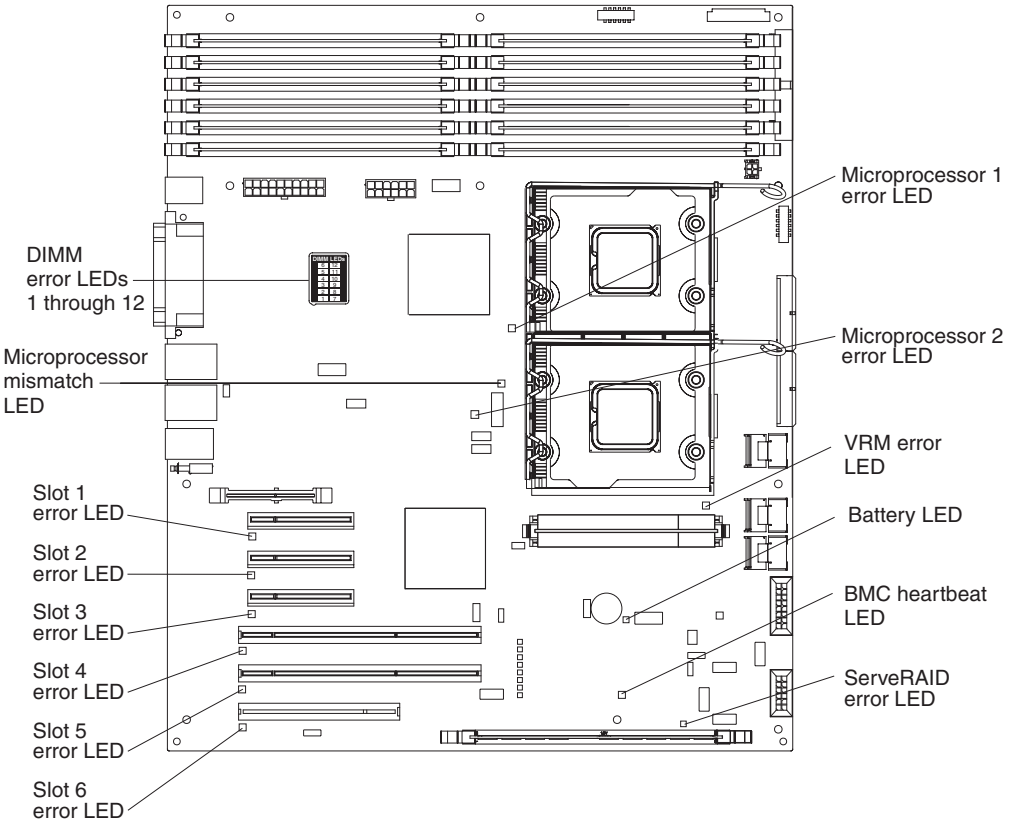
System-board option connectors

The following illustration shows the system-board connectors for user-installable options.



System-board LEDs

The following illustration shows the light-emitting diodes (LEDs) on the system board.



For more information about the system-board LEDs, see the *Problem Determination and Service Guide* on the IBM *System x3400 Documentation* CD.

Installation guidelines

Before you install options, read the following information:

- Read the safety information that begins on page v, the guidelines in "Working inside the server with the power on" on page 23, and "Handling static-sensitive devices" on page 24. This information will help you work safely.
- Before you install optional hardware, make sure that the server is working correctly. Start the server, and make sure that the operating system starts, if an operating system is installed, or that a 19990305 error code is displayed, indicating that an operating system was not found but the server is otherwise working correctly. If the server is not working correctly, see the *Problem Determination and Service Guide* for diagnostic information.
- Observe good housekeeping in the area where you are working. Place removed covers and other parts in a safe place.
- If you must start the server while the cover is removed, make sure that no one is near the server and that no tools or other objects have been left inside the server.
- Do not attempt to lift an object that you think is too heavy for you. If you have to lift a heavy object, observe the following precautions:

  - Make sure that you can stand safely without slipping.
  - Distribute the weight of the object equally between your feet.
  - Use a slow lifting force. Never move suddenly or twist when you lift a heavy object.
  - To avoid straining the muscles in your back, lift by standing or by pushing up with your leg muscles.
- Make sure that you have an adequate number of properly grounded electrical outlets for the server, monitor, and other devices.
- Back up all important data before you make changes to disk drives.
- Have a small flat-blade screwdriver available.
- You do not have to turn off the server (some model) to install or replace hot-swap power supplies and hot-swap drives.
- Blue on a component indicates touch points, where you can grip the component to remove it from or install it in the server, open or close a latch, and so on.
- Orange on a component or an orange label on or near a component indicates that the component can be hot-swapped, which means that if the server and operating system support hot-swap capability, you can remove or install the component while the server is running. (Orange can also indicate touch points on hot-swap components.) See the instructions for removing and installing a specific hot-swap component for any additional procedures that you might have to perform before you remove or install the component.
- When you have to access the inside of the server, you might find it easier to lay the server on its side.
- When you are finished working on the server, reinstall all safety shields, guards, labels, and ground wires.
- For a list of supported options for the server, see http://www.ibm.com/servers/eserver/serverproven/compat/us/.

System reliability guidelines

To help ensure proper system cooling and system reliability, make sure that the following requirements are met:

- Each of the drive bays has a drive or a filler panel and electromagnetic compatibility (EMC) shield installed in it.
- There is adequate space around the server to allow the server cooling system to work properly. Leave approximately 50 mm (2.0 in.) of open space around the front and rear of the server. Do not place objects in front of the fans. For proper cooling and airflow, replace the server cover before turning on the server. Operating the server for extended periods of time (more than 30 minutes) with the server cover removed might damage server components.
- You have followed the cabling instructions that come with optional adapters.
- You have replaced a failed fan as soon as possible.
- You have replaced a hot-swap drive within 2 minutes of removal.

Working inside the server with the power on

Attention: Static electricity that is released to internal server components when the server is powered-on might cause the server to halt, which could result in the loss of data. To avoid this potential problem, always use an electrostatic-discharge wrist strap or other grounding system when working inside the server with the power on.

The server (some models) supports hot-swap devices and is designed to operate safely while it is turned on and the cover is removed. Follow these guidelines when you work inside a server that is turned on.

- Avoid wearing loose-fitting clothing on your forearms. Button long-sleeved shirts before working inside the server; do not wear cuff links while you are working inside the server.
- Do not allow your necktie or scarf to hang inside the server.
- Remove jewelry, such as bracelets, necklaces, rings, and loose-fitting wrist watches.
- Remove items from your shirt pocket, such as pens and pencils, that could fall into the server as you lean over it.
- Avoid dropping any metallic objects, such as paper clips, hairpins, and screws, into the server.

Handling static-sensitive devices

Attention: Static electricity can damage the server and other electronic devices. To avoid damage, keep static-sensitive devices in their static-protective packages until you are ready to install them.

To reduce the possibility of electrostatic discharge, observe the following precautions:

- Limit your movement. Movement can cause static electricity to build up around you.
- The use of a grounding system is recommended. For example, wear an electrostatic-discharge wrist strap, if one is available. Always use an electrostatic-discharge wrist strap or other grounding system when working inside the server with the power on.
- Handle the device carefully, holding it by its edges or its frame.
- Do not touch solder joints, pins, or exposed circuitry.
- Do not leave the device where others can handle and damage it.
- While the device is still in its static-protective package, touch it to an unpainted metal surface on the outside of the server for at least 2 seconds. This drains static electricity from the package and from your body.
- Remove the device from its package and install it directly into the server without setting down the device. If it is necessary to set down the device, put it back into its static-protective package. Do not place the device on the server cover or on a metal surface.
- Take additional care when handling devices during cold weather. Heating reduces indoor humidity and increases static electricity.

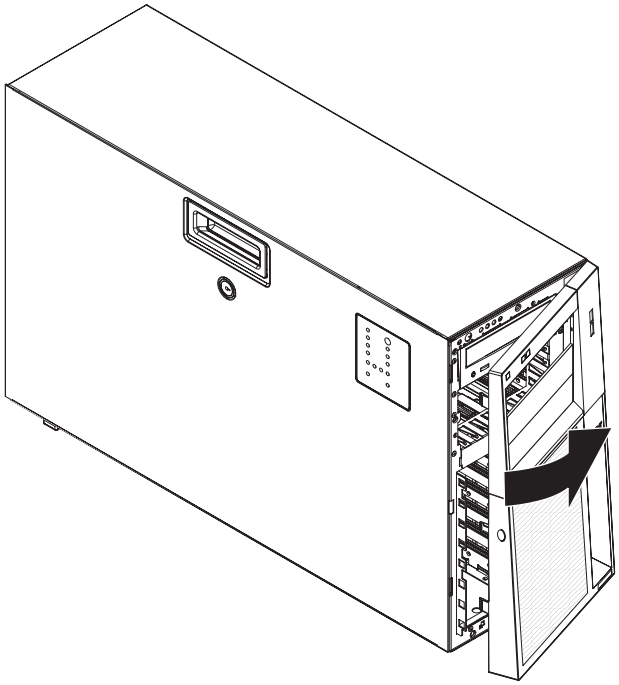
Removing the bezel

To remove the bezel, complete the following steps:

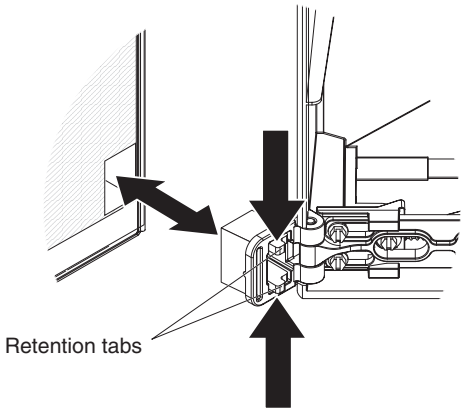
Note: The illustrations in this document might differ slightly from your hardware.

1. Read the safety information that begins on page v and “Installation guidelines” on page 22.
2. Unlock the side cover.

   Note: You must unlock the side cover to remove the bezel.
3. Position your finger on the depressed area on the left side of the bezel and rotate the bezel away from the server.



4. Press the retention tabs on the hinge assembly toward each other and pull the hinge assembly out of the chassis.



Note: The bezel will also disengage from the chassis hinges if you rotate the bezel beyond 180° or if excessive pressure is applied to the bezel. Do not be

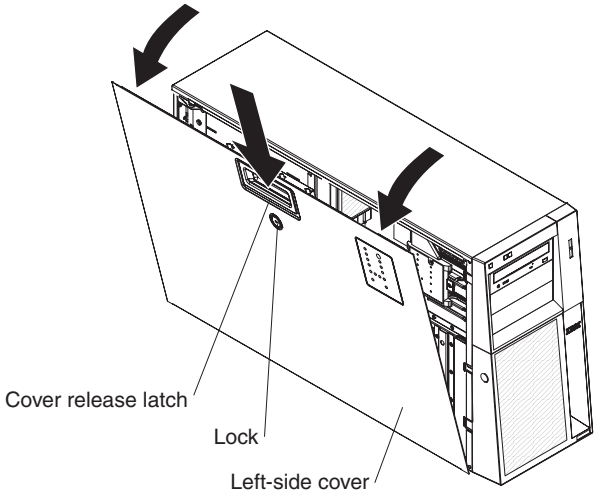
alarmed because this is how the bezel was designed. The bezel is designed with breakaway hinges so that you can easily reattach it to the chassis.

Removing the side cover

Important: Before you install optional hardware, make sure that the server is working correctly. Start the server, and make sure that the operating system starts, if an operating system is installed, or that a 19990305 error code is displayed, indicating that an operating system was not found but the server is otherwise working correctly. If the server is not working correctly, see the *Problem Determination and Service Guide* for diagnostic information.

To remove the server side cover, complete the following steps:

1. Read the safety information that begins on page v and "Installation guidelines" on page 22.
2. Turn off the server and all attached devices (see "Turning off the server" on page 16); then, disconnect all power cords and external cables.
3. Unlock the side cover.
4. Press the cover-release latch down (as indicated by the two arrows); then, remove the cover and set it aside.



5. Lift the side cover off the server and set it aside.

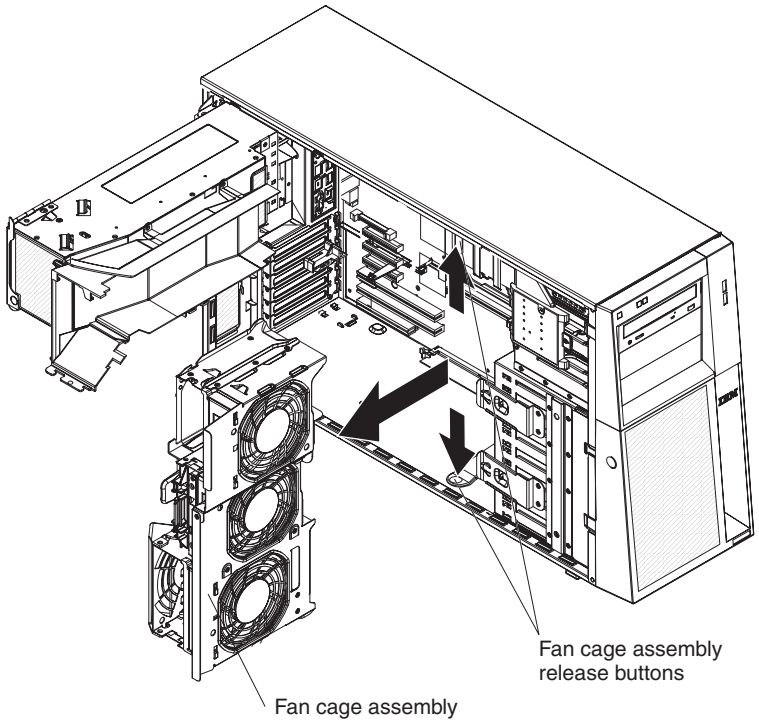
To replace the side cover, see "Replacing the side cover" on page 70.

Attention: For proper cooling and airflow, replace the cover before turning on the server. Operating the server for extended periods of time (more than 30 minutes) with the cover removed might damage server components.

Removing the front fan cage assembly

To remove the front fan cage assembly, complete the following steps:

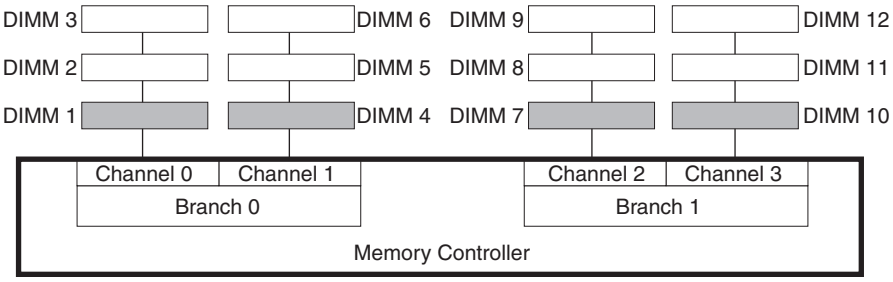
1. Read the safety information that begins on page v and “Installation guidelines” on page 22.
2. Turn off the server and peripheral devices, and disconnect the power cords and all external cables.
3. Lay the server on its side.
4. Unlock the side cover.
5. Remove the side cover (see “Removing the side cover” on page 26).
6. Rotate the power-supply cage assembly out of the chassis:
   - Hot-swap models:
     a. Remove the hot-swap power-supply. Press down on the orange release lever and pull the power supply out of the bay, using the handle.
     b. Lift up the power-supply cage handle and pull the power-supply cage assembly all the way up until the retainer latch locks the cage in place on the chassis.
   - Non-hot-swap models, lift up the power-supply cage handle and pull the power-supply cage assembly all the way up until the retainer latch locks the cage in place on the chassis.
7. Press in on the front fan cage assembly release buttons on the sides of the chassis to release the fan cage assembly from the connector on the chassis. Lift the fan cage assembly up and out of the chassis and set it aside.



Installing a memory module

The following notes describe the types of dual inline memory modules (DIMMs) that the server supports and other information that you must consider when installing DIMMs:

- The server supports industry-standard, 1.8 V, 240-pin, 667 MHz, PC2-5300 double-data-rate 2 (DDR2), dynamic random-access memory (DRAM) with error correcting code (ECC), fully buffered dual inline memory modules (DIMMs). These DIMMs must be compatible with the latest DDR2 667 MHz DRAM fully buffered DIMM specification. For a list of supported options for the server, see http://www.ibm.com/servers/eserver/serverproven/compat/us/; then, select your country and navigate to the list of options for the server.
- The DIMM options that are available for the server are 512 MB, 1 GB, and 2 GB in x4 or x8 technology, single-rank or double-rank. The server supports a minimum of 1 GB and a maximum of 32 GB (16 GB in mirrored mode) of system memory. The server comes with two 512 MB DIMMs installed.
- The system board provides 8 functional DIMM connectors and supports two-way memory interleaving when DIMMs are installed in pairs. However, DIMM connectors 3, 6, 9, and 12 are not functional. Do not install DIMMs in these four connectors and do not remove the DIMM thermal baffles installed in these connectors unless you need to replace the system board.
- The memory controller has four fully buffered DIMM channels that are organized into two branches. Each branch has two channels, and each channel controls two DIMMs. DIMMs that are next to each other (for example, DIMM slot 1 and DIMM slot 4) within the channels of a branch must be identical in size, type, speed, and technology. However, the DIMMs in the slots above or below each other within the channels of a branch do not have to be identical (for example, the DIMMs in DIMM slot 1 and DIMM slot 2 do not have to be identical). The following illustration shows how the memory controller is organized into branches and channels with two pairs of DIMMs installed.



- The server can operate in two major modes: mirroring and non-mirroring (normal). The server can also operate in a single-channel mode when one DIMM is installed.
- The server supports memory mirroring (mirroring mode) and online-spare memory.
  - Memory mirroring replicates and stores data on DIMMs within two branches simultaneously. You must enable memory mirroring through the Configuration/Setup Utility program (see “Using the Configuration/Setup Utility program” on page 76). To enable memory mirroring in the Configuration/Setup Utility program, select **Devices and I/O Ports → Advanced Chipset Control → Memory Branch Mode**. Use the arrow keys to change the Memory Branch Mode setting to **Mirror**; then, save your changes. When you use memory mirroring, consider the following information:

- The maximum available memory is reduced to 16 GB, instead of the 32 GB available in non-mirroring mode.
- The minimum memory configuration is four identical DIMMs. You must install identical pairs of fully buffered, dual-inline memory modules (DIMMs) in all four DIMM connectors (same size, type, speed, and technology). These DIMMs must span across both branches and all four channels. For example, when you install the first four DIMMs, you must install two DIMMs in branch 0 (one in channel 0 and one in channel 1) and two DIMMs in branch 1 (one in channel 2 and one in channel 3). See Table 4 for the DIMM installation sequence.
- When you upgrade the server to eight DIMMs, the DIMMs that are next to each other (for example, DIMM connector 1 and DIMM connector 4) within the channels of a branch must be identical in size, type, speed, and technology. However, the DIMMs in the connectors above or below each other within the channels of a branch do not have to be identical to each other (for example, the DIMMs in DIMM connector 1 and DIMM connector 2).
- Both branches operate in dual-channel mode.

The following table shows the DIMM configuration upgrade sequence for operating in mirroring mode.

Table 4. DIMM upgrade configuration sequence in mirroring mode

Number of DIMMs	**DIMM connectors**
4	1, 4, 7, 10
8	1, 4, 7, 10, 2, 5, 8, 11
Note: DIMM connectors 3, 6, 9, and 12 are not functional in this server. Do not install DIMMs in these connectors.	

– Online-spare memory disables a failed rank pair of DIMMs from the system configuration and activates an online-spare rank pair of DIMMs to replace the failed rank pair of DIMMs. For an online-space pair of DIMMs to be activated, you must enable this feature and have installed an additional rank pair of DIMMs of the same speed, type, size (or larger), and technology as the failed pair of DIMMs. You must enable the feature through the Configuration/Setup Utility program. To enable online-spare memory in the Configuration/Setup Utility program, select **Devices and I/O Ports → Advanced Chipset Control → Memory Branch Mode**. Use the arrow keys to change the setting for Branch 0 Rank Sparing or Branch 1 Rank Sparing to **Enabled** ; then, save your changes. See “Using the Configuration/Setup Utility program” on page 76 for additional information. When you use online-spare memory, you must consider the following information:
  - You cannot enable online-spare memory while the server is operating in mirroring mode.
  - The minimum memory configuration is two single-rank DIMMs installed in branch 0, DIMM connector 1 (in channel 0) and connector 4 (in channel 1); however, online-sparing is not supported with this configuration.
  - To support online-sparing in branch 0, you must add a second pair of DIMMs. The spare pair of DIMMs can be single-rank or double-rank and must be the same speed, type, size (or larger), and technology as the failed pair of DIMMs. The spare pair must be installed in branch 0, DIMM connector 2 (in channel 0) and connector 5 (in channel 1). However, if the DIMMs are double-rank and you install the spare pair of DIMMs in branch

1, DIMM connector 7 (channel 2) and connector 10 (channel 3) rather than branch 0, then branch 1 will support online-sparing and branch 0 will not.
  - Branch 0 and branch 1 operate independently.
- The following notes apply when the server operates in non-mirroring mode (normal mode):
  – DIMMs must be installed in matched pairs. If you install a second pair of DIMMs in DIMM connector 7 and DIMM connector 10, they do not have to be the same size, speed, type, and technology as the DIMMs in DIMM connector 1 and DIMM connector 4. However, the size, speed, type, and technology of the DIMMs that you install in DIMM connector 7 and DIMM connector 10 must match each other.
  – The following table shows the DIMM upgrade configuration sequence for operating in non-mirrored mode (normal mode).

Table 5. DIMM upgrade configuration sequence in non-mirroring mode

Number of DIMMs	DIMM connectors
2	1, 4
4	1, 4, 7, 10
6	1, 4, 7, 10, 2, 5
8	1, 4, 7, 10, 2, 5, 8, 11
Note: DIMM connectors 3, 6, 9, and 12 are not functional in this server. Do not install DIMMs in these connectors.	

- The amount of usable memory will be reduced depending on the system configuration. A certain amount of memory must be reserved for system resources. To view the total amount of installed memory and the amount of configured memory, run the Configuration/Setup Utility program and select **System Summary** from the menu. For additional information, see Chapter 3, “Configuring the server,” on page 75.
- The following tables show examples of maximum memory capacity when the server operates in mirroring and non-mirroring modes, using identical single-rank, x8 technology or double-rank, x4 technology DIMMs. The memory capacity is dependent on the size and technology of the DIMMs that you install.

Table 6. Example of the memory capacity when identical x8 technology single-rank DIMMs are used

DIMMs installed	x8 single-rank technology	Memory available in mirroring mode	Memory available in non-mirroring mode
8	512 Mb	2 GB	4 GB
8	1 Gb	4 GB	8 GB
8	2 Gb	8 GB	16 GB

Table 7. Example of the memory capacity when identical x4 technology double-rank DIMMs are used

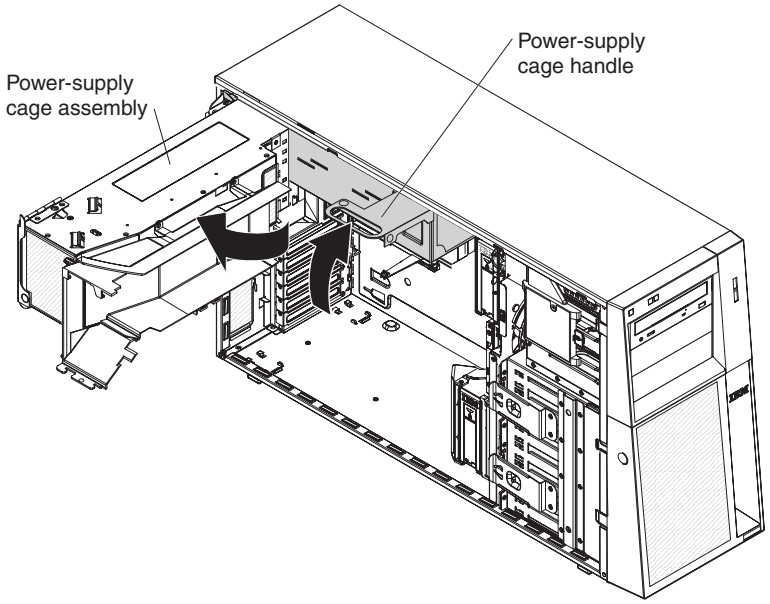
DIMMs installed	x4 double-rank technology	Memory available in mirroring mode	Memory available in non-mirroring mode
8	512 Mb	8 GB	16 GB
8	1 Gb	16 GB	32 GB

- When you restart the server after adding or removing a DIMM, the server displays a message that the memory configuration has changed.

Attention: Static electricity that is released to internal server components when the server is powered-on might cause the server to stop, which could result in the loss of data. To avoid this potential problem, always use an electrostatic-discharge wrist strap or other grounding system when working inside the server with the power on.

To install a DIMM, complete the following steps:

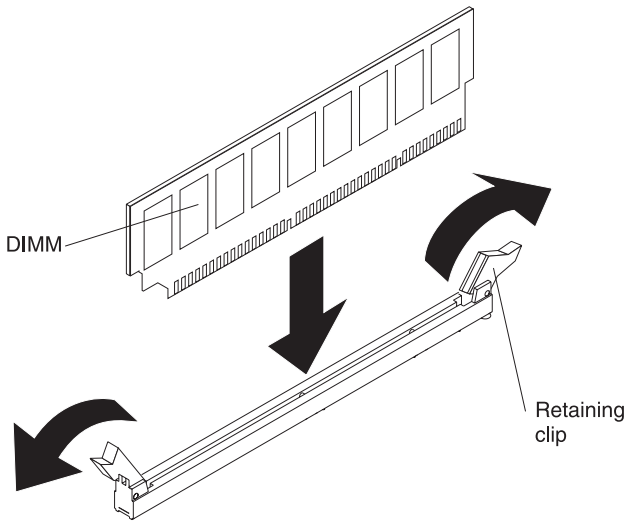
1. Read the safety information that begins on page v and “Installation guidelines” on page 22.
2. Turn off the server and peripheral devices, and disconnect the power cords and all external cables.
3. Unlock the side cover.
4. Remove the side cover (see “Removing the side cover” on page 26).
5. Rotate the power-supply cage assembly out of the chassis:
   - Hot-swap models:
     a. Remove the hot-swap power-supply. Press down on the orange release lever and pull the power supply out of the bay, using the handle.
     b. Lift up the power-supply cage handle and pull the power-supply cage assembly all the way up until the retainer latch locks the cage in place on the chassis.
   - Non-hot-swap models, lift up the power-supply cage handle and pull the power-supply cage assembly all the way up until the retainer latch locks the cage in place on the chassis.



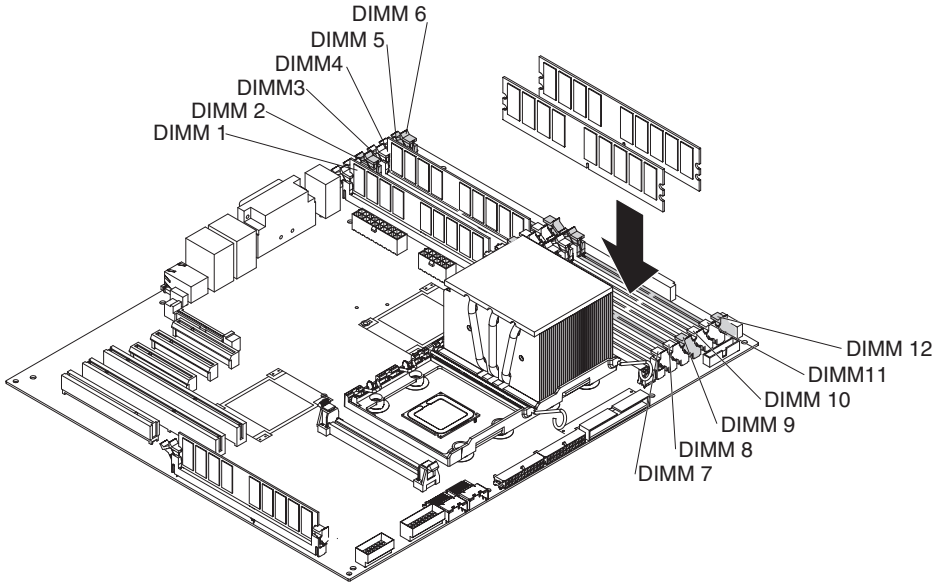
6. Locate the DIMM connectors on the system board. Determine the connector in which you will install the DIMMs. Install the DIMMs in the sequence indicated earlier in this section.

   Note: DIMM connectors 3, 6, 9, and 12 are not functional in this server. Do not install DIMMs in these connectors.
   Attention: To avoid breaking the retaining clips or damaging the DIMM connectors, open and close the clips gently.

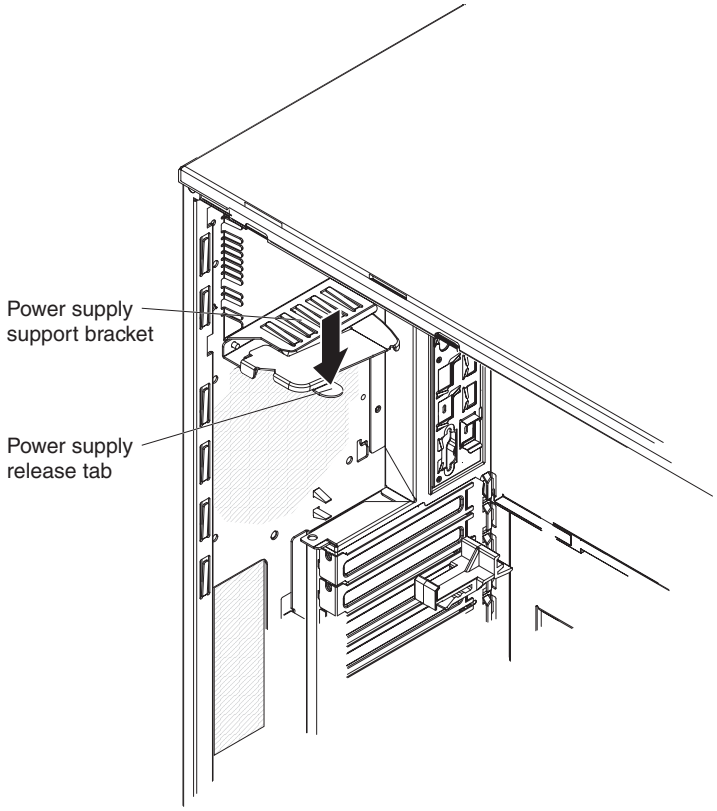
7. Open the retaining clips and, if necessary, remove any existing DIMM.



8. Touch the static-protective package that contains the DIMM to any unpainted metal surface on the server. Then, remove the new DIMM from the package.
9. Turn the DIMM so that the DIMM keys align correctly with the slot.
10. Insert the DIMM into the connector by aligning the edges of the DIMM with the slots at the ends of the DIMM connector. Firmly press the DIMM straight down into the connector by applying pressure on both ends of the DIMM simultaneously. The retaining clips snap into the locked position when the DIMM is firmly seated in the connector. If there is a gap between the DIMM and the retaining clips, the DIMM has not been correctly installed. Open the retaining clips, remove the DIMM, and then reinsert it.



11. Rotate the power-supply cage assembly back into the server. Press the power-supply cage release tab and rotate the power-supply cage assembly into the chassis.



12. If you have a hot-swap model, reinstall the hot-swap power-supplies.

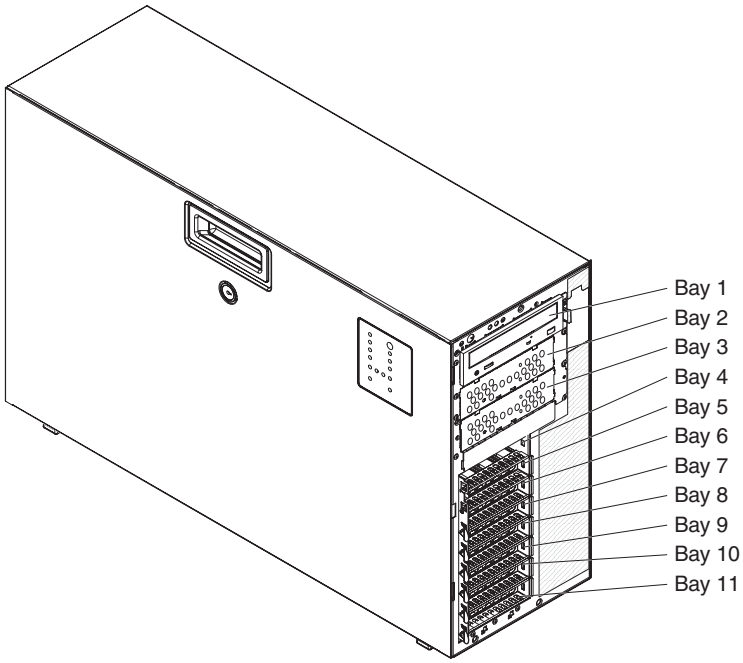
If you have other options to install or remove, do so now; otherwise, go to “Completing the installation” on page 68.

Installing a drive

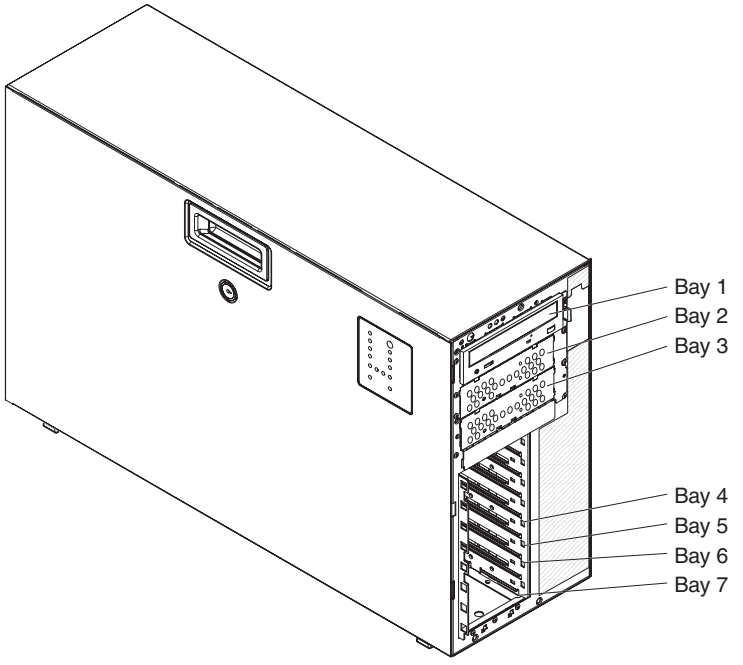
Depending on the server model, the server might come with an integrated drive electronics (IDE) CD-ROM, CD-RW, or DVD/CD-RW drive in bay 1.

The following are illustrations of the server and the location of the drive bays. Your hardware might differ, depending on the model.

The following is an illustration of the hot-swap server models.



The following is an illustration of the simple-swap server models.



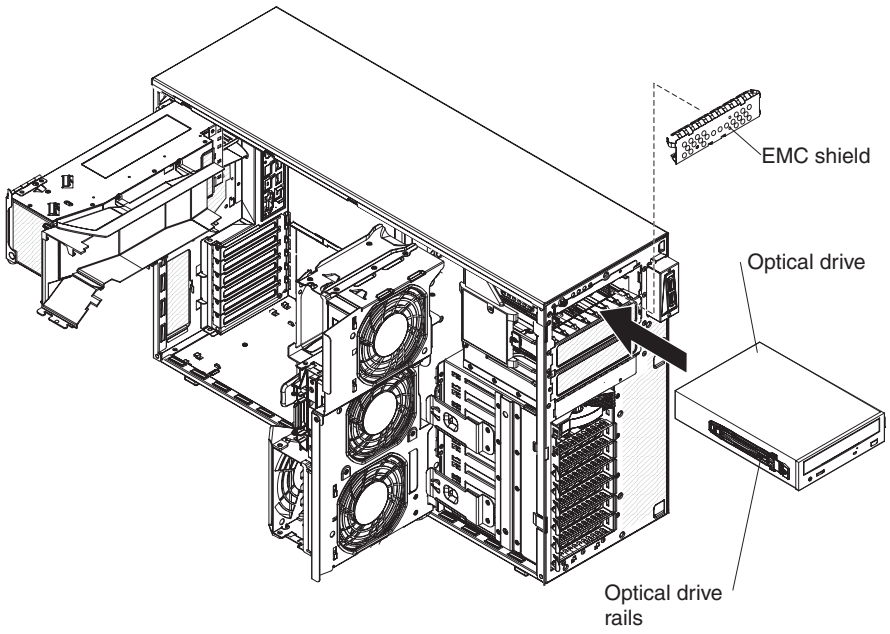
The following notes describe the types of drives that the server supports and other information that you must consider when installing a drive:

- Make sure that you have all the cables and other equipment that is specified in the documentation that comes with the drive.
- Check the instructions that come with the drive to see whether you have to set any switches or jumpers on the drive. If you are installing a SAS or SATA device, be sure to set the SAS or SATA ID for that device.
- Optional external USB FDD drives, tape drives, CD-ROM drives, CD-RW drives, and DVD/CD-RW combo drives are examples of removable-media drives. You can install removable-media drives only in bays 1, 2, and 3.
- To install a 3.5-in. drive in a 5.25-in. bay, you must use a 5.25-in. conversion kit.
- The electromagnetic interference (EMI) integrity and cooling of the server are protected by having all bays and PCI, PCI Express, and PCI-X slots covered or occupied. When you install a drive or PCI, PCI Express, or PCI-X adapter, save the EMC shield and filler panel from the bay or the PCI, PCI Express, or PCI-X adapter slot cover in the event that you later remove the drive or adapter.
- For a complete list of supported options for the server, see http://www.ibm.com/servers/eserver/serverproven/compat/us/.

Installing a CD or DVD drive

To install a CD or DVD drive, complete the following steps:

1. Read the safety information that begins on page v and “Installation guidelines” on page 22.
2. Turn off the server and peripheral devices, and disconnect the power cords and all external cables.
3. Unlock the side cover.
4. Remove the side cover (see “Removing the side cover” on page 26).
5. Place your finger on the depression area on the left side of the bezel door and rotate it away from the server. After you rotate the bezel beyond 90°, pull the bezel off the server and set it aside.
6. Remove the EMC shield from the bay in which you want to install the drive.



Note: If you are installing a drive that contains a laser, observe the following safety precaution.

Statement 3:

CAUTION:
When laser products (such as CD-ROMs, DVD drives, fiber optic devices, or transmitters) are installed, note the following:

- **Do not remove the covers. Removing the covers of the laser product could result in exposure to hazardous laser radiation. There are no serviceable parts inside the device.**
- **Use of controls or adjustments or performance of procedures other than those specified herein might result in hazardous radiation exposure.**

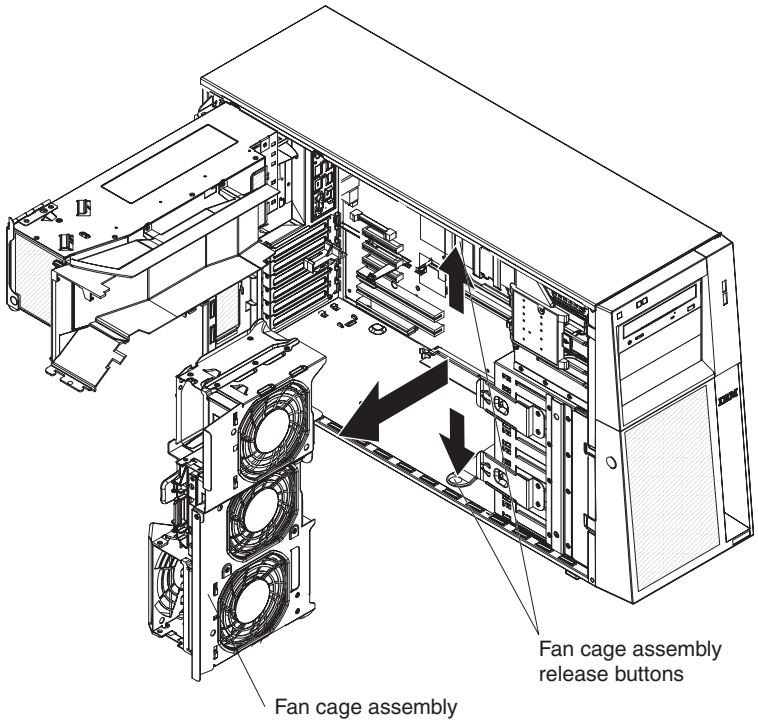
DANGER

Some laser products contain an embedded Class 3A or Class 3B laser diode. Note the following.

Laser radiation when open. Do not stare into the beam, do not view directly with optical instruments, and avoid direct exposure to the beam.

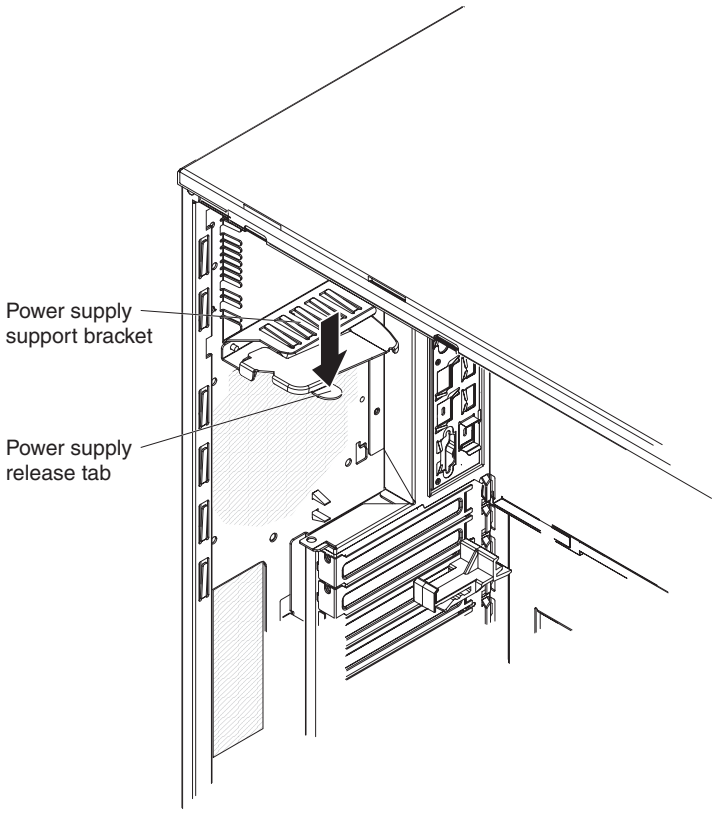
Class 1 Laser Product
Laser Klasse 1
Laser Klass 1
Luokan 1 Laserlaite
Appareil À Laser de Classe 1

7. Rotate the power-supply cage assembly out of the chassis:
   - Hot-swap models:
     a. Remove the hot-swap power-supply. Press down on the orange release lever and pull the power supply out of the bay, using the handle.
     b. Lift up the power-supply cage handle and pull the power-supply cage assembly all the way up until the retainer latch locks the cage in place on the chassis.
   - Non-hot-swap models, lift up the power-supply cage handle and pull the power-supply cage assembly all the way up until the retainer latch locks the cage in place on the chassis.
8. Press in on the front fan cage assembly release buttons on the sides of the chassis to release the fan cage assembly from the connector on the chassis. Lift the fan cage assembly up and out of the chassis and set it aside.



9. Touch the static-protective package that contains the drive to any unpainted metal surface on the server; then, remove the drive from the package and place it on a static-protective surface.
10. Set any jumpers or switches on the drive according to the documentation that comes with the drive.

    Note: You might find it easier to install the new drive from the front and then attach the cables.
11. Remove the blue optical drive rails from the inside of the drive bay in which you want to install the drive. Align the holes on the blue optical drive rails with the pins on the side of the drive and snap the optical drive rails onto the drive.
12. If you are installing a 5.25-in. drive in bay 2, push the drive into the bay until it locks into place. If you are installing a 3.5-in. drive in bay 2, attach the 5.25-in. conversion kit and push the drive into the drive bay.
13. Connect one end of the signal cable to the rear of the drive and make sure that the other end of the cable is connected to the applicable IDE connector on the system board.
14. Route the signal cable so that it does not block the airflow to the rear of the drives or over the microprocessor and dual inline memory modules (DIMMs).
15. If you have another drive to install or remove, do so now.
16. Reinstall the front fan cage assembly. Align the front fan cage assembly over the fan cage assembly slot and with the connector on the system board. Lower the fan cage assembly into the chassis and press down firmly until the fan cage assembly is seated firmly in place.
17. Rotate the power-supply cage assembly back into the server. Press the power-supply cage release tab and rotate the power-supply cage assembly into the chassis.



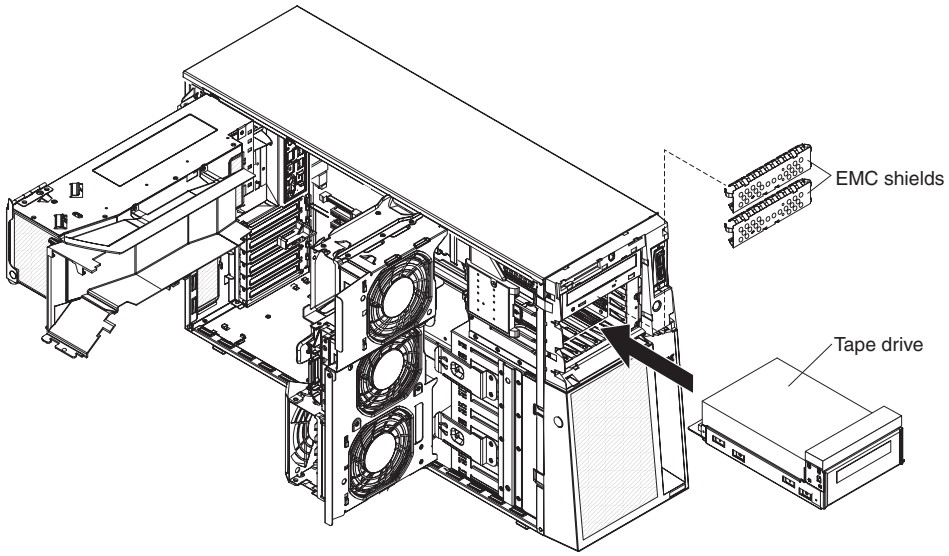
18. If you have a hot-swap model, reinstall the hot-swap power-supplies.
19. Connect the power cable to the rear of the drive. The connectors are keyed and can be inserted only one way.

If you have other options to install or remove, do so now; otherwise go to “Completing the installation” on page 68.

Installing a tape drive

To install a tape drive, complete the following steps.

1. Read the safety information that begins on page v and “Installation guidelines” on page 22.
2. Turn off the server and peripheral devices, and disconnect the power cords and all external cables.
3. Unlock the side cover.
4. Remove the side cover (see “Removing the side cover” on page 26.
5. Place your finger on the depression area on the left side of the bezel door and rotate it away from the server. After you rotate the bezel beyond 90°, pull the bezel off the server and set it aside.
6. Remove the EMC shields from the bays in which you want to install the tape drive.



7. Rotate the power-supply cage assembly out of the chassis:
   - Hot-swap models:
     a. Remove the hot-swap power-supply. Press down on the orange release lever and pull the power supply out of the bay, using the handle.
     b. Lift up the power-supply cage handle and pull the power-supply cage assembly all the way up until the retainer latch locks the cage in place on the chassis.
   - Non-hot-swap models, lift up the power-supply cage handle and pull the power-supply cage assembly all the way up until the retainer latch locks the cage in place on the chassis.
8. Press in on the front fan cage assembly release buttons on the sides of the chassis to release the fan cage assembly from the connector on the chassis. Lift the fan cage assembly up and out of the chassis and set it aside.
9. Touch the static-protective package that contains the tape drive to any unpainted metal surface on the server; then, remove the tape drive from the package and place it on a static-protective surface.
10. Slide the tape drive into the server from the front of the drive cage, then connect the IDE cable to the tape drive.
11. Secure the tape drive to the chassis with the supplied screws.
12. Connect the tape drive cable to the tape drive connector on the system board.
13. Reinstall the front fan cage assembly. Align the front fan cage assembly over the fan cage assembly slot and with the connector on the system board. Lower the fan cage assembly into the chassis and press down firmly until the fan cage assembly is seated firmly in place.
14. Rotate the power-supply cage assembly back into the server. Press the power-supply cage release tab and rotate the power-supply cage assembly into the chassis.
15. If you have a hot-swap model, reinstall the hot-swap power-supplies.

If you have other options to install or remove, do so now; otherwise go to “Completing the installation” on page 68.

Installing a hot-swap hard disk drive

Some server models come with hot-swap SAS or SATA hot-swap hard disk drives. Before you install a hot-swap hard disk drive, read the following information:

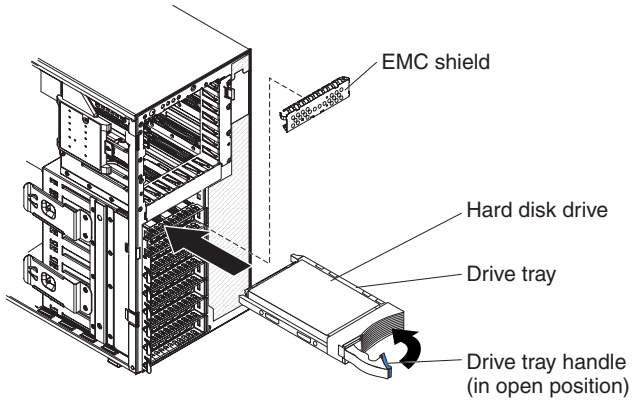
- The hot-swap drives must be either all SAS hard disk drives or all SATA hard disk drives; do not mix SAS and SATA drives.
- The sequence for installing the hard disk drives is to install the drives starting from the top bay (bay 4) and go down to the bottom bay (bay 11).
- Inspect the drive tray for signs of damage.
- Make sure that the drive is correctly installed in the tray.
- You do not have to turn off the server to install hot-swap drives in the hot-swap drive bays.
- All hot-swap drives must have the same throughput speed rating; mixing speed ratings might cause all drives to operate at the lower throughput speed.
- The drive ID for each hot-swap hard disk drive is printed on the bezel.
- If you want to install the maximum number of hot-swap drives (eight), you must order the 4-drive backplane option kit.

  Attention: When you install the optional 4-drive backplane option kit to upgrade to eight drives, make sure that you remove the dust shield (if one is present) from the hot-swap SAS/SATA signal connector on the system board. Carefully grasp the dust shield and pull it out of the signal connector.
- To maintain proper system cooling, do not operate the server for more than 10 minutes without either a drive or a filler panel installed in each drive bay.

Attention: Static electricity that is released to internal server components when the server is powered-on might cause the server to stop, which could result in the loss of data. To avoid this potential problem, always use an electrostatic-discharge wrist strap or other grounding system when working inside the server with the power on.

To install a hot-swap hard disk drive, complete the following steps:

1. Read the safety information that begins on page v and “Installation guidelines” on page 22.
2. Unlock the side cover.
3. Remove the side cover (see “Removing the side cover” on page 26.
4. Place your finger on the depression area on the left side of the bezel door and rotate it away from the server. After you rotate the bezel beyond 90°, pull the bezel off the server and set it aside.
5. Remove the EMC shield from the bay in which you want to install the drive.
6. Touch the static-protective package that contains the drive to any unpainted metal surface on the server; then, remove the drive from the package and place it on a static-protective surface.
7. Install the hard disk drive in the hot-swap bay:
   a. Make sure that the drive tray handle is open.
   b. Align the drive assembly with the guide rails in the bay.



c. Gently slide the drive assembly into the drive bay until the drive stops.

d. Push the drive tray handle to the closed (locked) position.

e. Check the hard disk drive status indicator to make sure that the hard disk drive is operating correctly. (You might have to restart the server before the drive is recognized.) If the amber hard disk drive status LED for a drive is lit continuously, it indicates that the drive is faulty and must be replaced. If the amber hard disk drive status LED for a drive is flashing slowly, this indicates that the drive is being rebuilt. If the amber hard disk drive status LED for a drive is flashing rapidly, this indicates that the controller is identifying the drive. If the green hard disk drive activity LED is flashing, it indicates that the drive is in use.

   Note: If the server is configured for RAID operation using an optional ServeRAID adapter, you might have to reconfigure your disk arrays after installing hard disk drives. See the ServeRAID documentation on the *IBM ServeRAID Support* CD for additional information about RAID operation and complete instructions for using ServeRAID Manager.

8. If you are installing additional hot-swap hard disk drives, do so now.

If you have other options to install or remove, do so now; otherwise go to "Completing the installation" on page 68.

IDs for hot-swap hard disk drives

Hot-swap server models have drive bays that are connected to a SAS/SATA backplane. This backplane, also known as the hot-swap-drive backplane, is the printed circuit board behind these bays.

The hot-swap-drive backplane controls the IDs for the internal hot-swap drive bays. The following table lists the IDs for the hard disk drives and backplane that are connected to hot-swap models.

Device	ID
Drive bay 4	0
Drive bay 5	1
Drive bay 6	2
Drive bay 7	3
Drive bay 8	4
Drive bay 9	5

Device	ID
Drive bay 10	6
Drive bay 11	7

Installing a simple-swap SATA hard disk drive

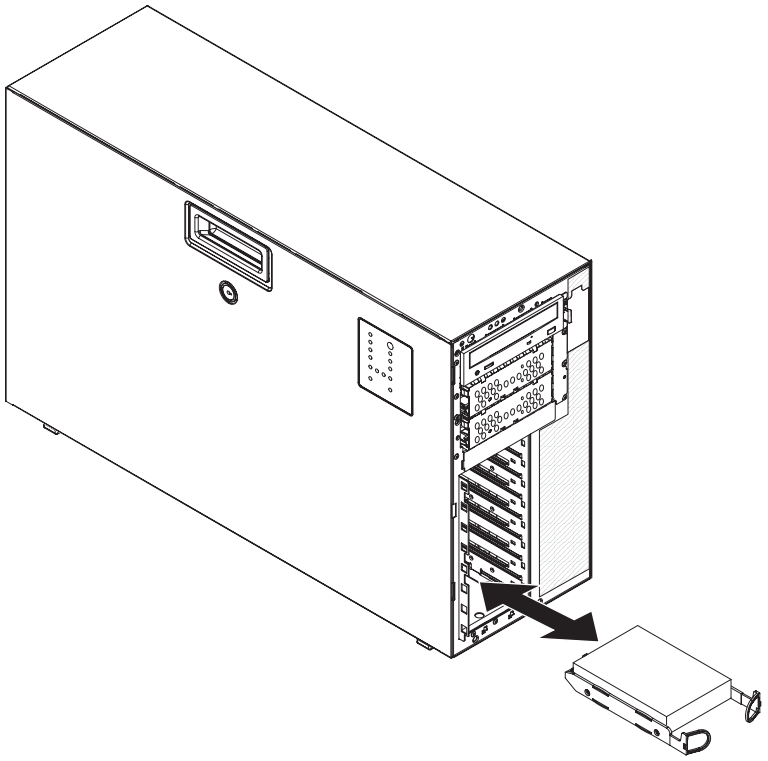
Some server models come with simple-swap SATA hard disk drives that are accessible from the front of the server. You must turn off the server before installing simple-swap drives in the server. Before you install a simple-swap SATA hard disk drive, read the following information:

- You can only install four simple-swap SATA hard disk drives in the server.
- The sequence for installing the hard disk drives is to install the drives starting from the bottom bay (bay 7) and go up to the top bay (bay 4).

To install a simple-swap hard disk drive, complete the following steps:

1. Read the safety information that begins on page v and “Installation guidelines” on page 22.
2. Turn off the server and peripheral devices and disconnect all external cables and power cords.
3. Unlock the side cover.
4. Remove the side cover (see “Removing the side cover” on page 26.
5. Place your finger on the depression area on the left side of the bezel door and rotate it away from the server. After you rotate the bezel beyond 90°, pull the bezel off the server and set it aside.
6. Touch the static-protective package that contains the drive to any unpainted metal surface on the server; then, remove the drive from the package and place it on a static-protective surface.
7. Align the drive assembly with the guide rails in the bay (the connector end of the drive goes in first).
8. Press the drive assembly loops toward each other; then, carefully slide the drive assembly into the drive bay until it stops and release the loops.

   Note: Do not release the loops on the drive assembly until it is completely seated.



Note: If the server is configured for RAID operation using an optional ServeRAID adapter, you might have to reconfigure your disk arrays after installing hard disk drives. See the ServeRAID documentation on the *IBM ServeRAID Support* CD for additional information about RAID operation and complete instructions for using ServeRAID Manager.

If you have other options to install or remove, do so now; otherwise, go to "Completing the installation" on page 68.

The simple-swap-drive backplate controls the IDs for the internal simple-swap drive bays. The following table lists the IDs for the hard disk drives and backplate that are connected to simple-swap models.

Device	ID
Drive bay 4	3
Drive bay 5	2
Drive bay 6	1
Drive bay 7	0

Power and signal cables for internal drives

The server uses cables to connect parallel IDE, simple-swap SATA, hot-swap SATA and hot-swap SAS devices to the power supply and to the system board. (See "System-board internal connectors" on page 18 for the location of system-board connectors.) Review the following information before connecting power and signal cables to internal drives:

- The drives that are preinstalled in the server come with power and signal cables attached. If you replace any drives, remember which cable is attached to which drive.

- If you have only one IDE device on a cable, it must be set as a master device.
- If two IDE devices are used on a single cable, one must be designated as the master device and the other as the subordinate device; otherwise, the server might not recognize some of the IDE devices. The master and subordinate designation is determined by switch or jumper settings on each IDE device.
- When you route a cable, make sure that it does not block the airflow to the rear of the drives or over the microprocessor or DIMMs.

The following cables are provided:

- **IDE:** The wider IDE signal cable has three connectors. One of these connectors is attached to the drive, one is a spare, and the third is attached to the IDE connector on the system board. The spare connector can be used to connect an additional IDE optical drive or tape drive to the server.

  The CD or DVD drive is attached to an ATA 100 signal cable. The blue connector is attached to the system board. The connector on the other end is attached to the master IDE device. The middle connector attaches to an optional optical device or tape drive.
- **Simple-swap SATA:** The combination signal/power cable connects to the system board and simple-swap SATA backplate to provide signal and power to the simple-swap SATA drives.

  Simple-swap SATA models come with the combination signal/power cable connected to the system board and the simple-swap SATA backplate.

  Notes:

  1. You can install the optional ServeRAID-8k Controller in the simple-swap SATA models to get RAID level-5 support. If you install the ServeRAID-8k Controller, you will need to switch the hard disk drive signal cable to a different connector on the system board and connect a RAID level-5 Enabler plug to the system board. See “Installing the ServeRAID-8k adapter” on page 57 for information on how to install and cable ServeRAID-8k Controller in simple-swap SATA models for RAID level-5 support.
  2. When you install the optional ServeRAID-8k Controller in the simple-swap SATA models for RAID support, make sure that you remove the dust shield (if one is present) from the signal connector on the system board before installing the signal cable. Carefully grasp the dust shield and pull it out of the signal connector.
- You can order an optional IBM ServeRAID-MR10is VAULT SAS/SATA Controller that supports RAID levels 0, 1, 5, 6, 10, 50, and 60. You can install the ServeRAID-MR10is SAS/SATA controller only in server models with eight 3.5 inch hot-swap hard disk drives installed. For instructions on how to install the ServeRAID-MR10is SAS/SATA controller, see “Installing the optional IBM ServeRAID-MR10is VAULT SAS/SATA Controller” on page 60 for instructions on how to install this adapter.

  Note: Note: The onboard RAID controller will be disabled by BIOS when the ServeRAID-MR10is SAS/SATA controller is installed in the server.
- **Hot-swap SAS or hot-swap SATA:** Hot-swap SAS and hot-swap SATA models come with a single signal cable and a single power cable that connects to the system board and the hot-swap SAS/SATA backplane to provide signal and power to the SAS or SATA drives. If you order the 4-drive backplane option kit to upgrade to eight drives, the option kit comes with an additional signal cable and power cable.

  Hot-swap SAS and hot-swap SATA models come with the signal cable and power cable connected to the system board and the hot-swap SAS/SATA backplane.

Note: When you install the optional 4-drive backplane option kit to upgrade to eight drives, make sure that you remove the dust shield (if one is present) from the hot-swap SAS/SATA signal connector on the system board. Carefully grasp the dust shield and pull it out of the signal connector.

For more information about the requirements for SAS cables and connecting SAS devices, see the documentation that comes with these devices.

For a list of supported options for the server, see http://www.ibm.com/servers/eserver/serverproven/compat/us/.

Installing an adapter

The following notes describe the types of adapters that the server supports and other information that you must consider when installing an adapter. Adapter that the server supports might vary, depending on your server model.

- Locate the documentation that comes with the adapter and follow those instructions in addition to the instructions in this section. If you must change the switch setting or jumper settings on the adapter, follow the instructions that come with the adapter.
- Read the documentation that comes with your operating system.
- The server comes with the following adapter connectors, or slots:
  - Slot 1, PCI Express x8 (x4)

    Important: The *x8 (x4)* designation for slot 1 identifies an x8 slot that is designed to support x4 adapters and x8 adapters that can downshift to operate at the x4 bandwidth. If you install an x8 adapter in slot 1 that can downshift to the x4 bandwidth, it will run at the x4 bandwidth. The x8 connector can be used for x4 and x8 adapters. Check the information that comes with your adapter for compatibility information.
  - Slot 2, PCI Express x8 (x8)
  - Slot 3, PCI Express x8 (x8)
  - Slot 4, PCI-X 64-bit/133 MHz
  - Slot 5, PCI-X 64-bit/133 MHz
  - Slot 6, PCI 32-bit/33 MHz
- You can install full-length adapters that are included in the ServerProven® list in slots 2, 3, 4 and 5. You can only install half-length adapters in slots 1 and 6.
- The 32-bit slot 6 supports 5.0 V keyed PCI adapters; they do not support 3.3 V keyed adapters. Universal adapters are supported in slots 4 and 5 if they are universally keyed.
- You can order an optional IBM ServeRAID-MR10is VAULT SAS/SATA Controller that supports RAID levels 0, 1, 5, 6, 10, 50, and 60. You can install the ServeRAID-MR10is SAS/SATA controller only in server models with eight 3.5 inch hot-swap hard disk drives installed. PCI slot 2 is the dedicated slot for the ServeRAID-MR10is SAS/SATA controller. For instructions on how to install the ServeRAID-MR10is SAS/SATA controller, see “Installing the optional IBM ServeRAID-MR10is VAULT SAS/SATA Controller” on page 60.

  Note: Note: The onboard RAID controller will be disabled by BIOS when the ServeRAID-MR10is SAS/SATA controller is installed in the server.
- The server scans PCI Express slot 1, PCI-X slots 4 and 5, and PCI-Express slots 2 and 3 to assign system resources. Then, the server starts the devices in the

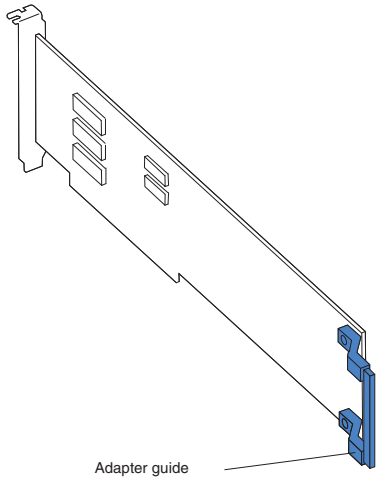
following order, if you have not changed the default startup sequence: PCI Express slot 1, PCI-X slots 4 and 5, PCI Express slot 2, PCI slot 6, and PCI Express slot 3.

- For a list of supported options for the server, see http://www.ibm.com/servers/eserver/serverproven/compat/us/.

To install an adapter, complete the following steps:

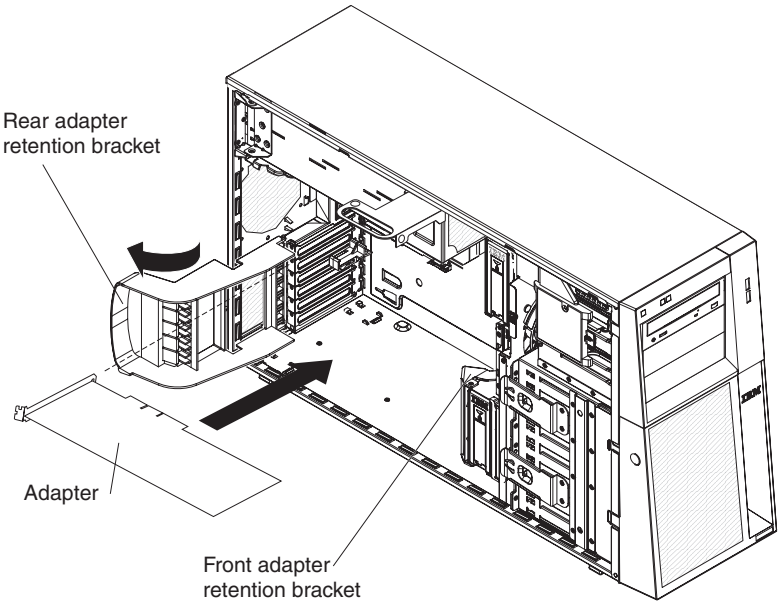
1. Read the safety information that begins on page v and “Installation guidelines” on page 22.
2. Turn off the server and peripheral devices and disconnect all external cables and power cords; then, remove the side cover. See “Removing the side cover” on page 26.
3. Follow the cabling instructions that come with the adapter to set jumpers or switches, if there are any. Route the adapter cables before you install the adapter.
4. Rotate the rear adapter-retention bracket to the open (unlocked) position.
5. If you are installing a full-length adapter, press on the release lever on the right side of the front adapter-retention bracket to release the retaining tab on the left side of the bracket.
6. Remove the screw that secures the expansion-slot cover to the chassis. Store the expansion-slot cover and screw in a safe place for future use.

   Note: Expansion-slot covers must be installed on all vacant slots. This maintains the electronic emissions standards of the server and ensures proper ventilation of server components.
7. Touch the static-protective package that contains the adapter to any unpainted metal surface on the server. Then, remove the adapter from the static-protective package. Avoid touching the components and gold-edge connectors on the adapter.
8. If you are installing a full-length adapter, remove the blue adapter guide (if any) from the end of the adapter.



9. Carefully grasp the adapter by the top edge or upper corners, and align it with the expansion slot guides; then, press the adapter *firmly* into the expansion slot. Move the adapter directly from the static-protective package to the expansion slot.

Note: If any adapters in the server are large or have heavy cables attached to them, you can remove the rear adapter-retention bracket and secure all of the adapters with expansion-slot screws (the expansion-slot screws are located on the side of the optical drive cage).



10. Connect required cables to the adapter. Route cables so that they do not block the flow of air from the fans.
11. Rotate the rear adapter-retention bracket to the closed (locked) position.
12. Rotate the front adapter-retention bracket to the closed (locked) position.

If you have other options to install or remove, do so now; otherwise, go to "Completing the installation" on page 68.

Installing a microprocessor

The following notes describe the type of microprocessor that the server supports and other information that you must consider when installing a microprocessor:

- The server comes with one microprocessor installed, but supports up to two microprocessors.

  Note: A microprocessor must be installed and removed only by a trained service technician.
- Read the documentation that comes with the microprocessor to determine whether you have to update the basis input/output system (BIOS) code. To download the most current level of BIOS code for your server, go to http://www.ibm.com/support/, and click **Downloads and drivers**.
- When you install a second microprocessor, you must also install the voltage regulator module (VRM), which comes with the microprocessor option kit, in the VRM connector on the system board.
- Some models support dual-core microprocessors or quad-core microprocessors. Do not mix dual-core microprocessors and quad-core microprocessors in the same system. Install all dual-core or all quad-core microprocessors in the server.
- To ensure that the server operates correctly, use microprocessors that have the same cache and type, and the same clock speed. The microprocessor internal and external clock frequencies must be identical. You can use the

Configuration/Setup Utility program to determine the specific type of microprocessor that is installed on the system board.

- The microprocessor speeds are automatically set for this server; therefore, you do not have to set any microprocessor frequency-selection jumpers or switches.
- If the thermal-grease protective cover (for example, a plastic cap or tape liner) is removed from the heat sink, do not touch the thermal grease on the bottom of the heat sink or set down the heat sink.
- If you have to replace a microprocessor, call for service.
- To order additional microprocessor options, contact your IBM marketing representative or authorized reseller.

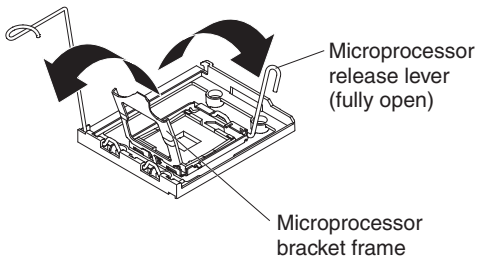
See “System-board option connectors” on page 21 for the location of the microprocessor connectors and the VRM connector.

To install an additional microprocessor, complete the following steps:

1. Read the safety information beginning on page v, and “Installation guidelines” on page 22.
2. Turn off the server and disconnect all power cords and external cables (see “Turning off the server” on page 16); then, unlock and remove the server cover (see “Removing the side cover” on page 26).
3. Rotate the power-supply cage assembly out of the chassis:
   - Hot-swap models:
     a. Remove the hot-swap power-supply. Press down on the orange release lever and pull the power supply out of the bay, using the handle.
     b. Lift up the power-supply cage handle and pull the power-supply cage assembly all the way up until the retainer latch locks the cage in place on the chassis.
   - Non-hot-swap models, lift up the power-supply cage handle and pull the power-supply cage assembly all the way up until the retainer latch locks the cage in place on the chassis.
4. Remove the microprocessor air baffle by grasping the two tabs and squeezing them together slightly and lift the baffle out of the server.
5. Rotate the rear system fan air baffle up out of the way by grasping the tab and pulling the baffle all the way up; then, slide it outward over the rear of the server until it locks in place.
6. Locate the second microprocessor connector on the system board.
7. Install the VRM in the VRM connector:
   a. Turn the VRM so that the VRM keys align correctly with the slot connector.
   b. Firmly press the VRM straight down into the connector by applying pressure on both ends of the VRM simultaneously.
   c. Make sure that the retaining clips are in the locked position when the VRM is firmly seated in the connector.
8. Install the microprocessor:
   a. Touch the static-protective package that contains the microprocessor to any unpainted metal surface on the server. Then, remove the microprocessor from the package.
   b. Remove the protective cover, tape, or label from the surface of the microprocessor socket, if any is present.

Attention: Make sure that the release lever on the microprocessor socket is in the fully open position before you insert the microprocessor in the socket. Failure to do so might result in permanent damage to the microprocessor, microprocessor socket, and system board.

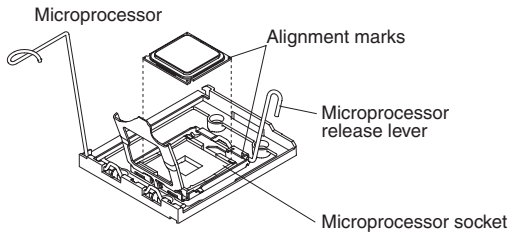
c. Rotate the release lever on the microprocessor socket from its closed and locked position to its fully open position.



Attention:

- Do not use excessive force when pressing the microprocessor into the socket.
- Make sure that the microprocessor is oriented and aligned with land number 1 in the socket before you try to close the lever.

d. Align the microprocessor with the socket (note the alignment mark and the position of the notches); then, carefully place the microprocessor on the socket and close the microprocessor bracket frame.



e. Carefully close the release lever to secure the microprocessor in the socket.

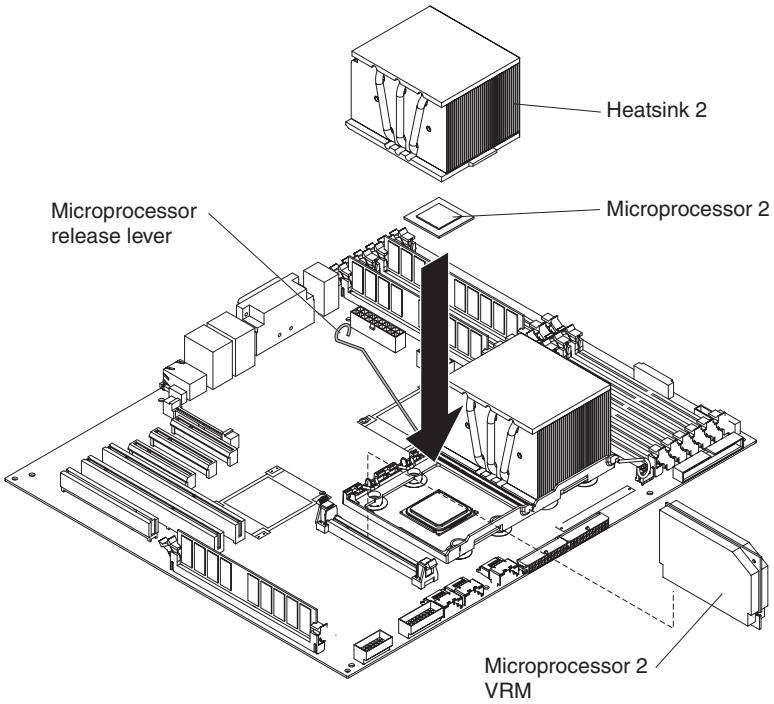
9. Install the heat sink.

Attention: Do not touch the thermal grease on the bottom of the heat sink or set down the heat sink after you remove the plastic cover. Touching the thermal grease will contaminate it.

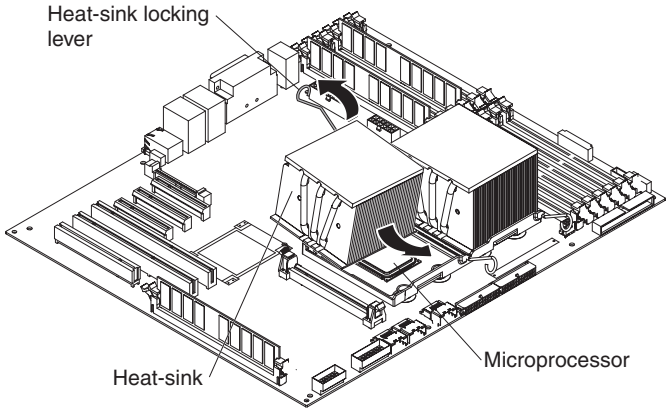
a. Make sure that the heat-sink lever is in the open position.

b. Remove the plastic protective cover from the bottom of the heat sink.

c. Align the heat sink above the microprocessor with the thermal-grease side down. Press firmly on the heat sink.



d. Slide the flange of the heat sink into the opening beneath the retainer bracket.



e. Press down firmly on the heat sink until it is seated securely.

f. Rotate the heat-sink lever to the closed position and hook it underneath the lock tab.

10. Reinstall the microprocessor air baffle.
11. Rotate the rear system fan air baffle back into the server.
12. Rotate the power-supply cage assembly back into the server. Press the power-supply cage release tab and rotate the power-supply cage assembly into the chassis.
13. If you have a hot-swap model, reinstall the hot-swap power supplies.

If you have other options to install or remove, do so now. Otherwise, go to "Completing the installation" on page 68.

Installing a hot-swap power supply

The following notes describe the type of power supply that the server supports and other information that you must consider when installing a power supply:

- The server comes with one power supply.
- The redundant mode requires two 835-watt hot-swap power supplies in the server. You must install an additional redundant power and cooling option kit (the option kit comes with an 835-watt hot-swap power supply and three hot-swap fans) to upgrade to redundant mode.
- This procedure applies only to server models that have hot-swap power supplies. If you have a non-hot-swap model, it comes with only one 670-watt power supply, which must be replaced only by a service technician.

When you remove or install a hot-swap power supply, observe the following precautions.

Statement 8:

CAUTION:
Never remove the cover on a power supply or any part that has the following label attached.

Hazardous voltage, current, and energy levels are present inside any component that has this label attached. There are no serviceable parts inside these components. If you suspect a problem with one of these parts, contact a service technician.

Statement 11:

CAUTION:
The following label indicates sharp edges, corners, or joints nearby.

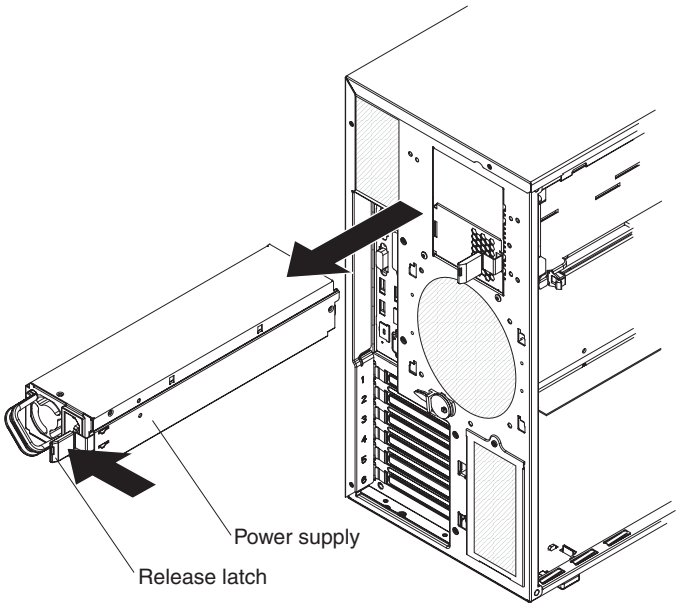
Statement 17:

CAUTION:
The following label indicates moving parts nearby.

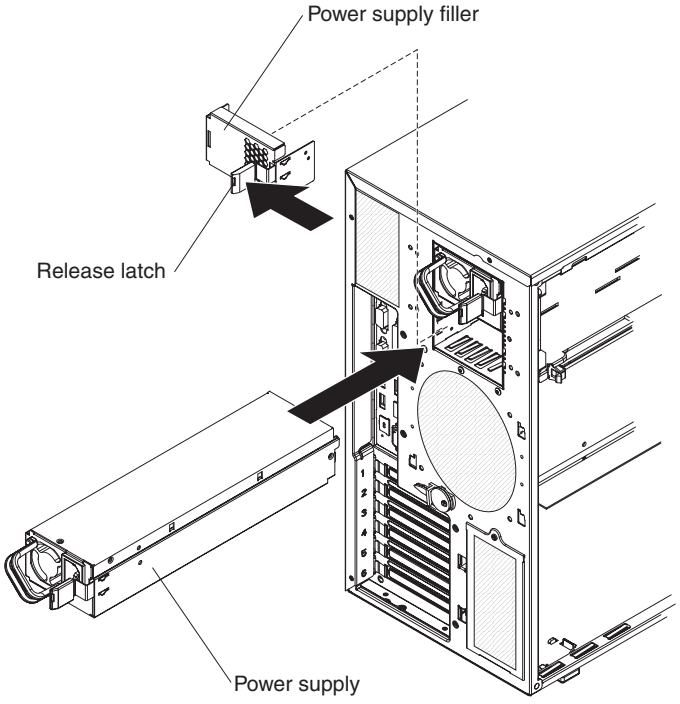
To replace a hot-swap power supply, complete the following steps:

1. Review the safety information that begins on page v and “Installation guidelines” on page 22.

   Attention: Static electricity that is released to internal server components when the server is powered-on might cause the server to halt, which could result in the loss of data. To avoid this potential problem, always use an electrostatic-discharge wrist strap or other grounding system when working inside the server with the power on.
2. Disconnect the power cord from the power supply that is to be removed.
3. If you are replacing a power-supply, press down on the orange release latch and pull the power supply out of the bay, using the handle.



4. If you are instructed to return the hot-swap power supply, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.
5. Touch the static-protective package that contains the hot-swap power supply to any unpainted metal surface on the server; then, remove the power supply from the package and place it on a static-protective surface.
6. Place the power supply into the bay guides.



7. Press down on the orange release lever and push the power supply toward the front of the chassis until it locks into place.
8. Connect one end of the power cord into the connector on the back of the power supply and connect the other end of the power cord into a properly grounded electrical outlet.

9. Make sure that both the ac and dc power LEDs on the rear of the power supply are lit, indicating that the power supply is operating correctly.
10. Connect the external cables and power cords.

If you have other options to install or remove, do so now; otherwise go to “Completing the installation” on page 68.

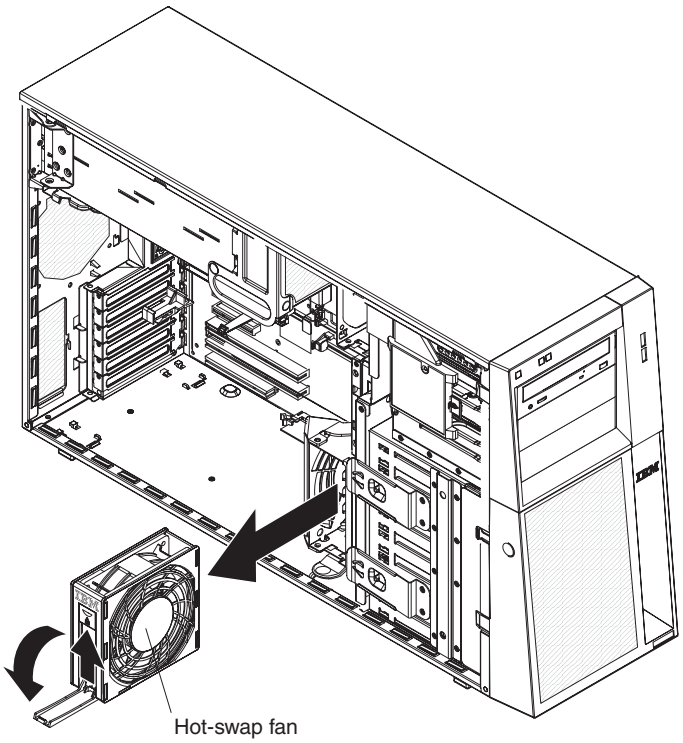
Installing a hot-swap fan

To replace a hot-swap fan, complete the following steps:

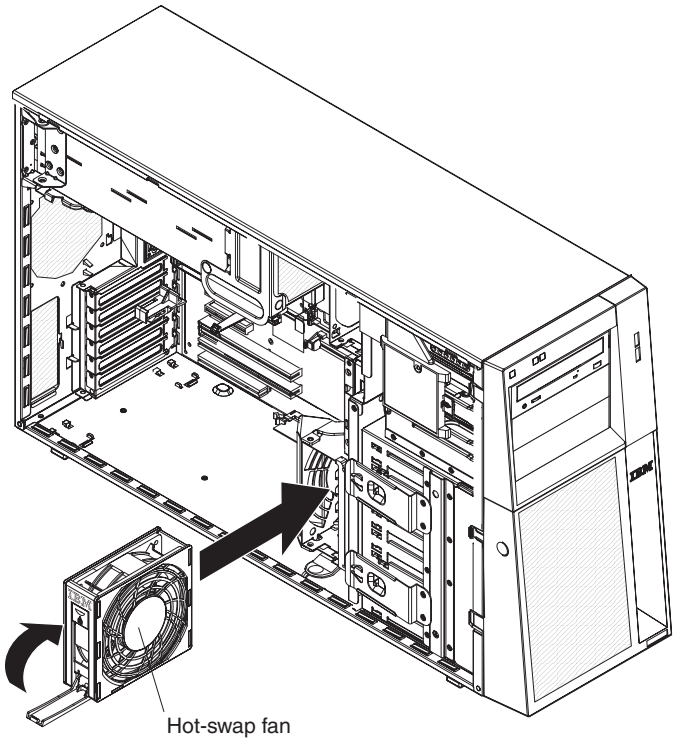
1. Review the safety information that begins on page v and “Installation guidelines” on page 22.

   Attention: Static electricity that is released to internal server components when the server is powered-on might cause the server to halt, which could result in the loss of data. To avoid this potential problem, always use an electrostatic-discharge wrist strap or other grounding system when working inside the server with the power on.
2. Remove the side cover (see “Removing the side cover” on page 26).

   Attention: To ensure proper system cooling, do not leave the cover off the server for more than 2 minutes.
3. Take your finger and slide the orange release tab in the direction indicated by the arrow on top of the fan to unlock the fan-locking handle. Grasp the fan handle and pull the fan out of the fan cage assembly.



4. If you are instructed to return the hot-swap fan, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.
5. Touch the static-protective package that contains the hot-swap fan to any unpainted metal surface on the server; then, remove the fan from the package and place it on a static-protective surface.
6. Align the fan over the fan slot.



7. Lower the fan into the slot and press down on the fan until it locks into place; then close the handle to the locked position.
8. Install the side cover (see “Replacing the side cover” on page 70).

If you have other options to install or remove, do so now; otherwise go to “Completing the installation” on page 68.

Installing the ServeRAID 8k-l adapter

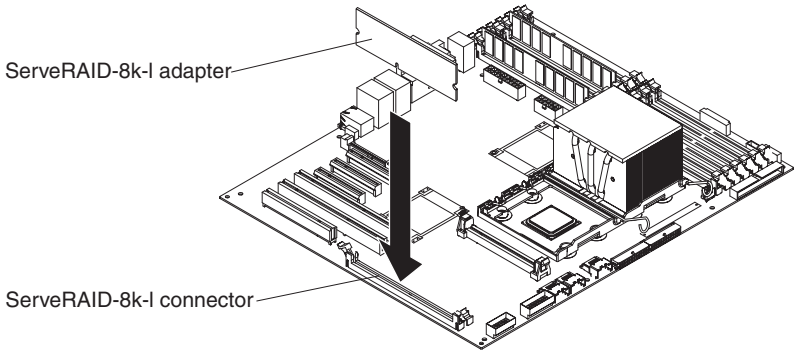
The IBM ServeRAID 8k-l adapter must be installed in its dedicated connector on the system board. See the following illustration for the location of the connector on the system board. The ServeRAID 8k-l adapter is not cabled to the system board and no rerouting of the SCSI cable is required.

To install the ServeRAID 8k-l adapter, complete the following steps:

1. Read the safety information beginning on page v, and “Installation guidelines” on page 22.
2. Turn off the server and peripheral devices, and disconnect the power cords and all external cables. Remove the side cover (see “Removing the side cover” on page 26.

   Attention: To avoid breaking the retaining clips or damaging the ServeRAID 8k-l adapter connector, open and close the clips gently.
3. Open the retaining clip on each end of the ServeRAID 8k-l adapter connector.
4. Touch the static-protective package containing the ServeRAID 8k-l adapter to any unpainted metal surface on the server. Then, remove the ServeRAID 8k-l adapter from the package.
5. Turn the ServeRAID 8k-l adapter so that the ServeRAID 8k-l adapter keys align correctly with the connector.

Attention: Incomplete insertion might cause damage to the system board or the ServeRAID 8k-l adapter.



6. Press the ServeRAID 8k-l adapter firmly into the connector.
7. If you have other options to install or remove, do so now.
8. Replace the side cover (see “Replacing the side cover” on page 70). Go to “Completing the installation” on page 68.

Installing the ServeRAID-8k adapter

The optional ServeRAID-8k adapter can be installed only in its dedicated connector on the system board. See the following illustration for the location of the connector on the system board. The ServeRAID-8k adapter is not cabled to the system board, and no rerouting of the SAS or SATA cable is required. However, if you install this optional ServeRAID-8k adapter in simple-swap SATA models, see the following instructions for cabling information.

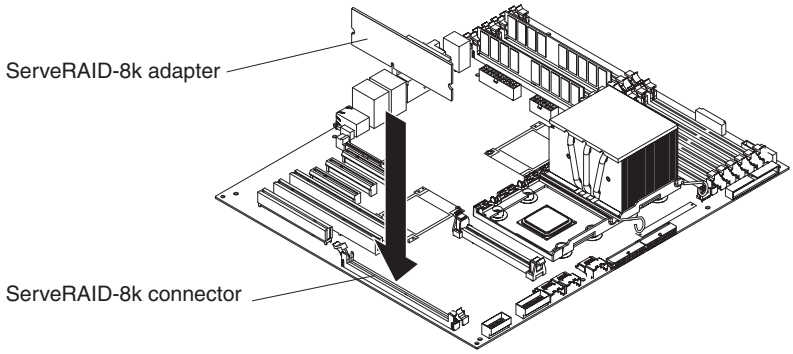
To install the ServeRAID-8k adapter, complete the following steps.

1. Read the safety information that begins on page v and “Handling static-sensitive devices” on page 24.
2. Turn off the server and peripheral devices, and disconnect the power cords and all external cables.

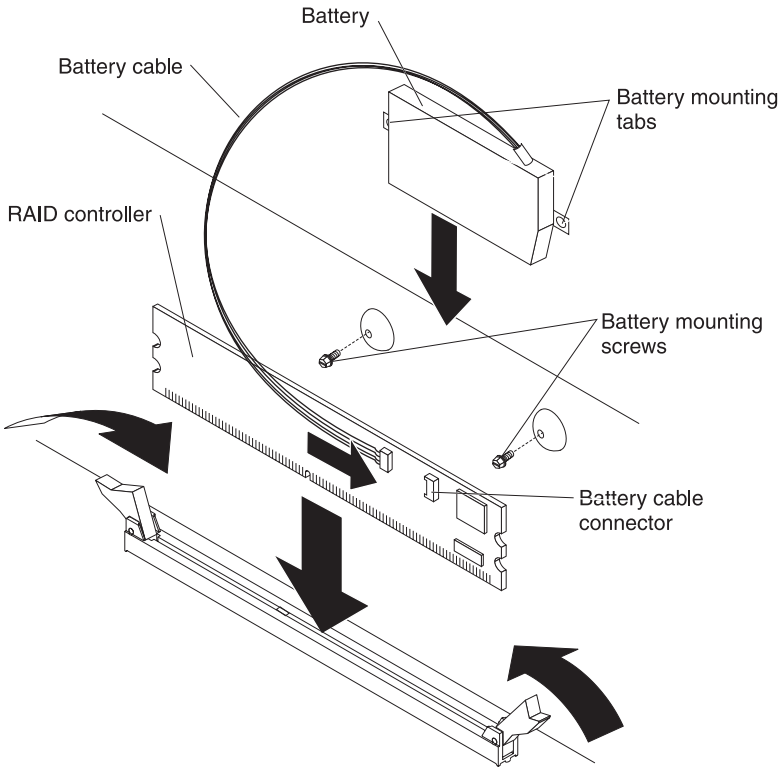
   Attention: To avoid breaking the retaining clips or damaging the ServeRAID-8k adapter connector, open and close the clips gently.
3. Remove the side cover (see “Removing the side cover” on page 26.
4. Open the retaining clips on each end of the ServeRAID-8k adapter connector.
5. Touch the static-protective package that contains the ServeRAID-8k adapter to any unpainted metal surface on the server. Then, remove the ServeRAID-8k adapter and battery pack from the package.

6. Turn the ServeRAID-8k adapter so that the ServeRAID-8k adapter keys align correctly with the connector on the system board..

   Attention: Incomplete insertion might cause damage to the system board or the ServeRAID-8k adapter.



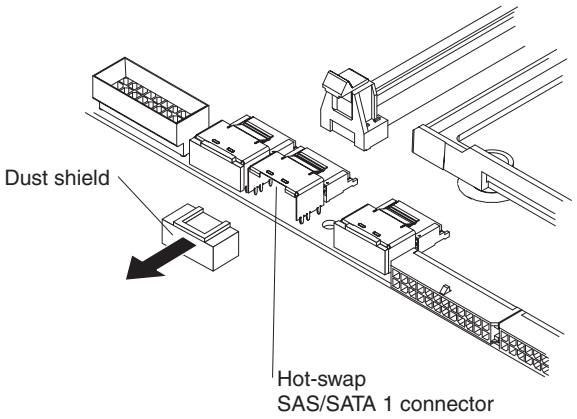
7. Press the ServeRAID-8k adapter firmly into the connector.
8. Mount the battery pack to the chassis, using the two mounting screws.



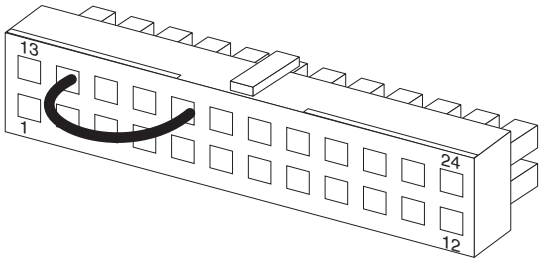
9. Plug the battery pack cable into the battery cable connector on the ServeRAID-8k adapter.

10. If you are installing the ServeRAID-8k adapter into a simple-swap SATA model, make the following cabling changes to enable RAID level-5 support:
    a. Disconnect the signal cable from the Simple-swap SATA backplate connector on the system board and connector it to the Hot-swap SAS/SATA 1 connector on the system board. See “System-board internal connectors” on page 18 for the location of these connectors on the system board.

       Note: Remove the dust shield (if one is present) from the Hot-swap SAS/SATA 1 signal connector on the system board before installing the signal cable. Carefully grasp the dust shield and pull it out of the signal connector.

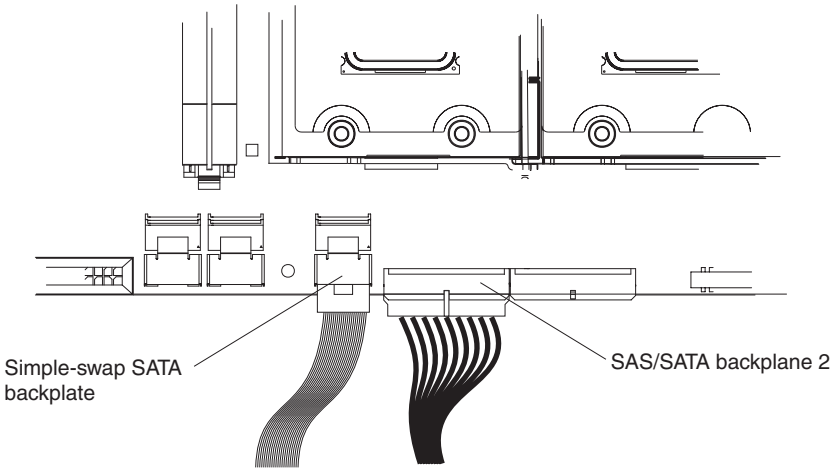


    b. Connect the RAID level-5 enabler plug (that came with the system) to the SAS/SATA backplane 1 connector on the system board.

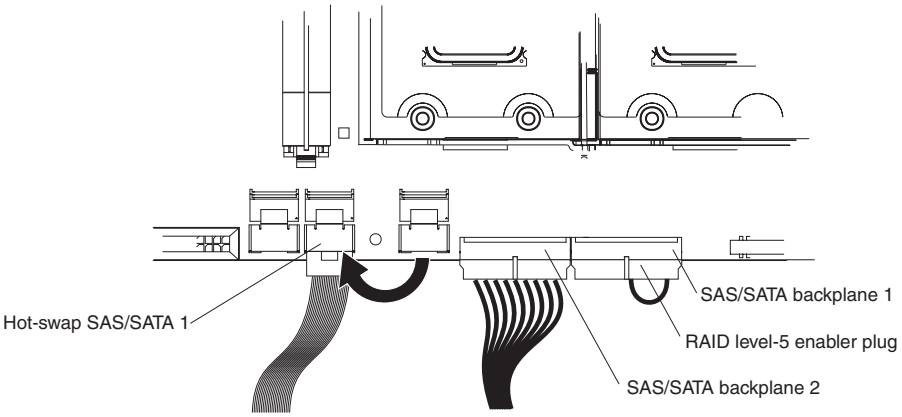


RAID level-5 enabler plug

The following illustration shows how the simple-swap SATA model is cabled when it is shipped.



The following illustration shows how the cables must be connected when you install the ServeRAID-8k Controller into the simple-swap SATA model.



11. If you have other options to install or remove, do so now.
12. Replace the side cover (see “Replacing the side cover” on page 70). Go to “Completing the installation” on page 68.

Installing the optional IBM ServeRAID-MR10is VAULT SAS/SATA Controller

The optional IBM ServeRAID-MR10is VAULT SAS/SATA controller can be installed only in its dedicated PCI slot 2 connector on the system board, and only in server models with eight 3.5-inch hot-swap hard disk drives. See “System-board option connectors” on page 21 for the location of the connector on the system board. The ServeRAID-MR10is SAS/SATA controller is not cabled to the system board. Instructions for routing the cables are described below.

To install the ServeRAID-MR10is SAS/SATA controller and route the cables, complete the following steps:

1. Read the safety information that begins on page v and “Handling static-sensitive devices” on page 24.
2. Turn off the server and peripheral devices, and disconnect the power cords and all external cables.

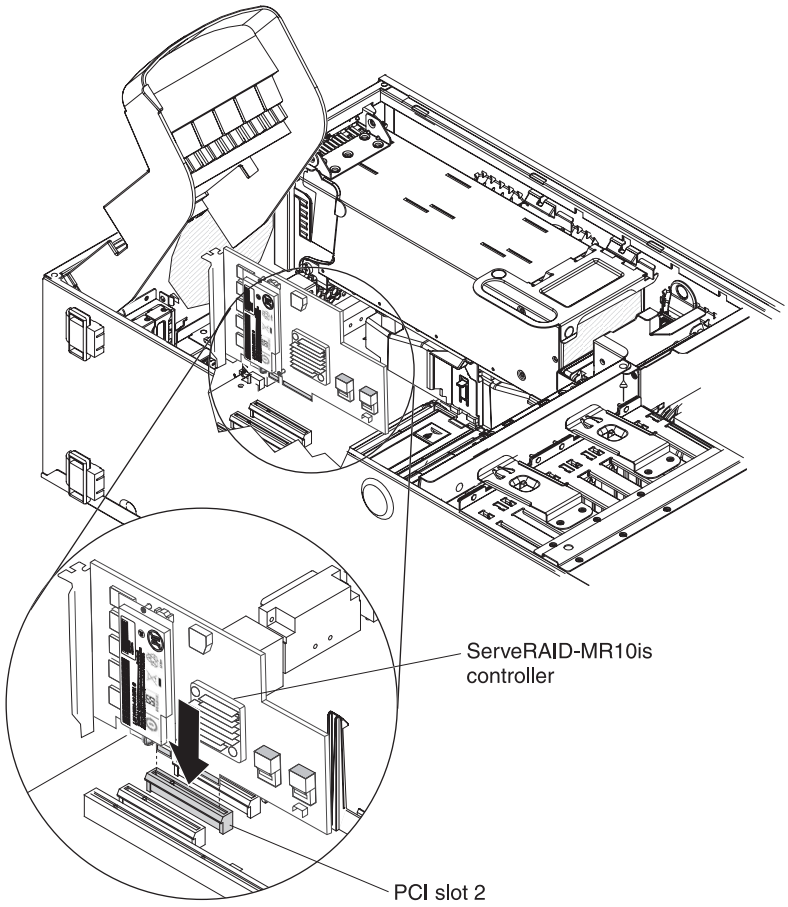
Attention: To avoid breaking the retaining clips or damaging the ServeRAID-MR10is SAS/SATA adapter connector, open and close the clips gently.

3. Remove the side cover (see “Removing the side cover” on page 26.
4. Rotate the rear adapter-retention bracket to the open (unlocked) position.
5. Remove the screw that secures the expansion-slot cover to the chassis (if no adapter is installed in the slot). Store the expansion-slot cover and screw in a safe place for future use.

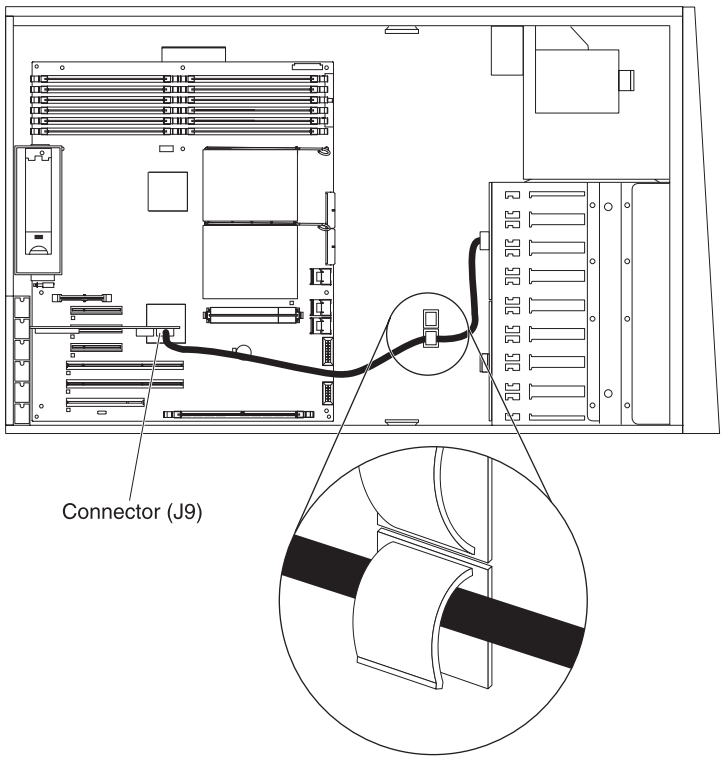
   Note: Expansion-slot covers must be installed on all vacant slots. This maintains the electronic emissions standards of the server and ensures proper ventilation of server components.
6. Open the retaining clips on each end of the ServeRAID-MR10is adapter connector.
7. Touch the static-protective package that contains the ServeRAID-MR10is adapter to any unpainted metal surface on the server; then, remove the ServeRAID-MR10is adapter from the package and place it on a static-protective surface.

8. Turn the ServeRAID-MR10is adapter so that the ServeRAID-MR10is adapter keys align correctly with the connector on the system board.

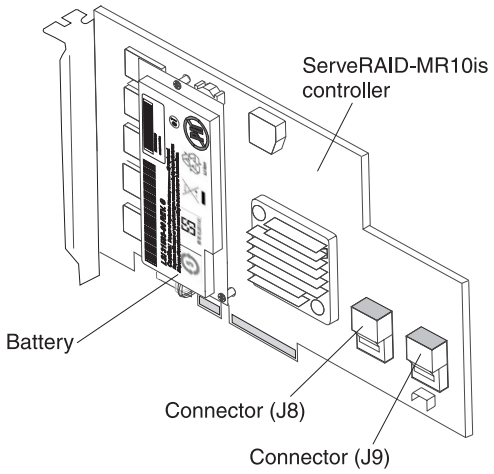
   Attention: Incomplete insertion might cause damage to the system board or the ServeRAID-MR10is adapter.



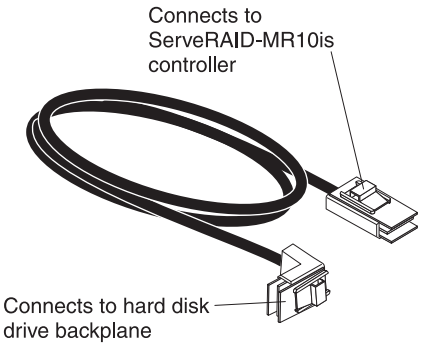
9. Press the ServeRAID-MR10is adapter firmly into the connector on the system board.
10. Rotate the power-supply cage assembly out of the chassis:
    a. Remove the hot-swap power-supply. Press down on the orange release lever and pull the power supply out of the bay, using the handle.
    b. Lift up the power-supply cage handle and pull the power-supply cage assembly all the way up until the retainer latch locks the cage in place on the chassis.
11. Remove the front fan cage assembly (see “Removing the front fan cage assembly” on page 27).
12. Take the other end of the signal cable that is attached to the drive backplane for drive bays 8 through 11 and route it through the plastic slot on the chassis underneath the front fan cage; then, connect it to connector J9 on the ServeRAID-MR10is SAS/SATA controller.



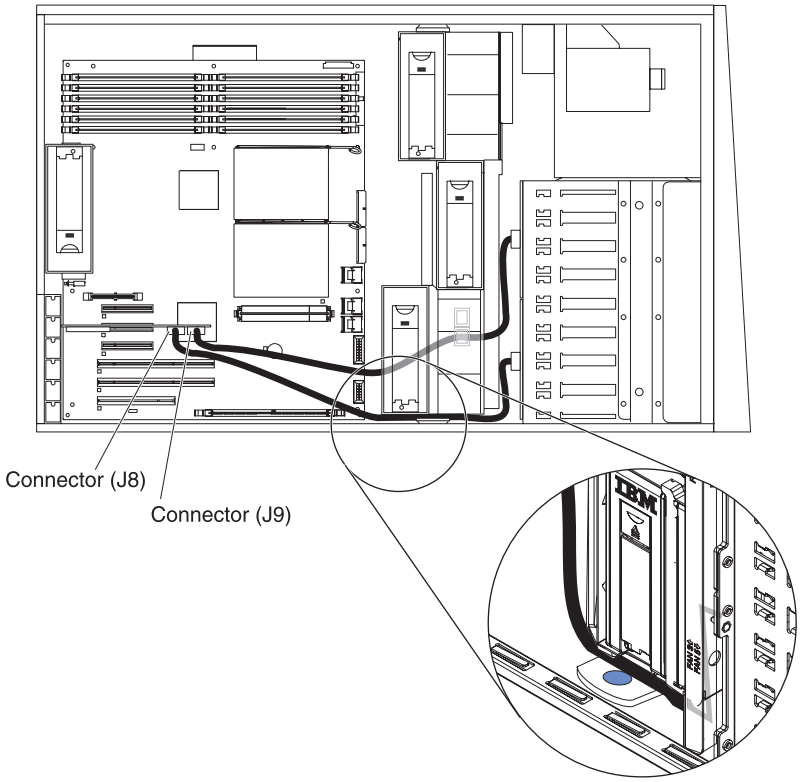
The following illustration shows the connectors on the controller to which you connect the signal cables from the drive backplanes.



The following illustration shows which end of the cable connects to the backplane and to the controller.



13. Reinstall the front fan cage assembly. Align the front fan cage assembly over the fan cage assembly slot and with the connector on the system board. Lower the fan cage assembly into the chassis and press down firmly until the fan cage assembly is seated firmly in place. Make sure that no cables will be pinched.
14. Take the other end of the signal cable that is attached to the drive backplane for drive bays 4 through 7 and route the cable around the right side of the front fan cage assembly and along the chassis wall (make sure that the cable is in front of the fan cage release tab): then, connect it to connector J8 on the ServeRAID-MR10is SAS/SATA controller.



15. Rotate the rear adapter-retention bracket to the closed (locked) position.
16. Rotate the power-supply cage assembly back into the server. Press the power-supply cage release tab and rotate the power-supply cage assembly into the chassis.
17. Reinstall the hot-swap power supplies.
18. If you have other options to install or remove, do so now.

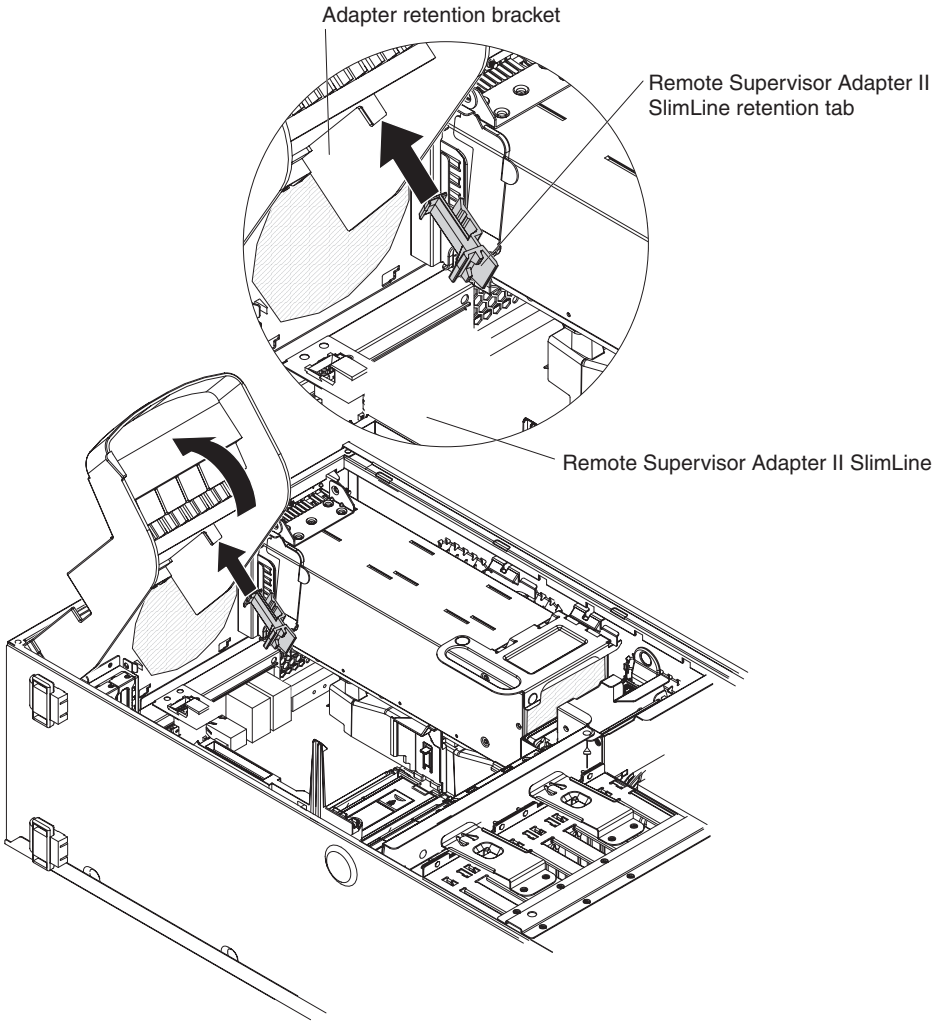
19. Replace the side cover (see “Replacing the side cover” on page 70). Go to “Completing the installation” on page 68.

Installing an IBM Remote Supervisor Adapter II SlimLine

An optional IBM Remote Supervisor Adapter II SlimLine must be installed only in its dedicated connector on the system board. See “System-board option connectors” on page 21 for the location of this connector on the system board. After you install the Remote Supervisor Adapter II SlimLine, the systems-management Ethernet port on the rear of the server is active.

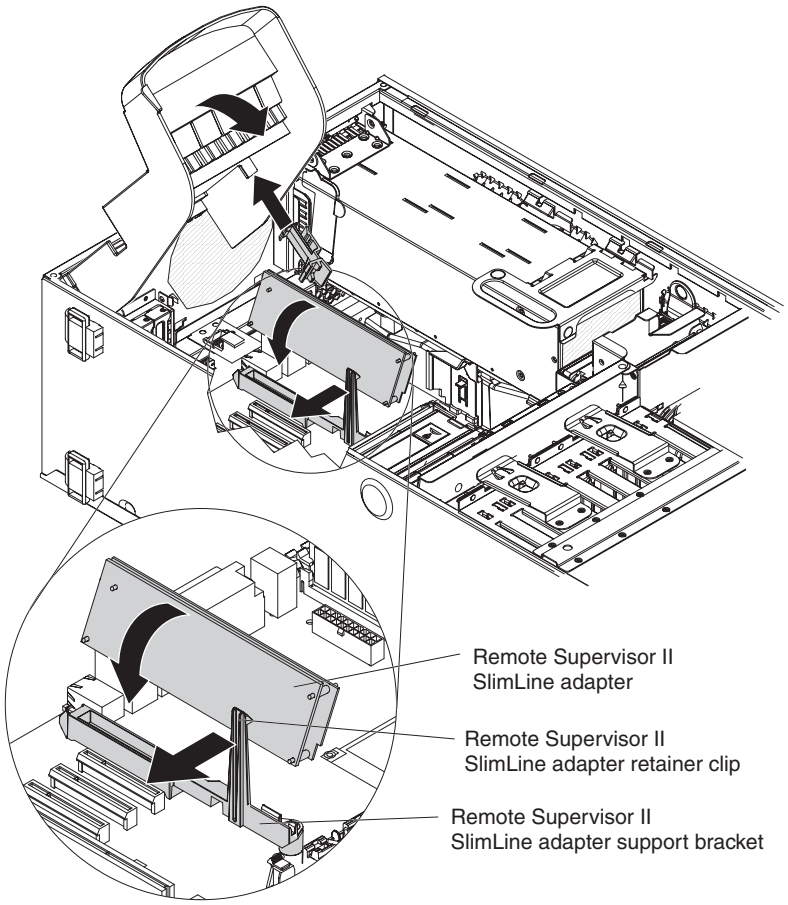
To install a Remote Supervisor Adapter II SlimLine, complete the following steps:

1. Read the safety information beginning on page v, and “Installation guidelines” on page 22.
2. Turn off the server and peripheral devices, and disconnect the power cords and all external cables.
3. Lay the server on its side.
4. Unlock the side cover.
5. Remove the side cover (see “Removing the side cover” on page 26.
6. Open the rear adapter retention bracket and install the Remote Supervisor Adapter II SlimLine retention tab on the bracket by clipping it onto the rear adapter retention bracket.


Adapter retention bracket
Remote Supervisor Adapter II SlimLine retention tab
Remote Supervisor Adapter II SlimLine

7. Carefully grasp the Remote Supervisor Adapter II SlimLine by its top edge or upper corners, and align it with the Remote Supervisor Adapter II SlimLine guide and the connector on the system board.

   Attention: Incomplete insertion might cause damage to the system board or the adapter.



8. Press the Remote Supervisor Adapter II SlimLine firmly into the connector and under the retention clip on the Remote Supervisor Adapter II SlimLine support bracket.
9. Close the rear adapter retention bracket.

If you have other options to install or remove, do so now; otherwise, Go to “Completing the installation” on page 68.

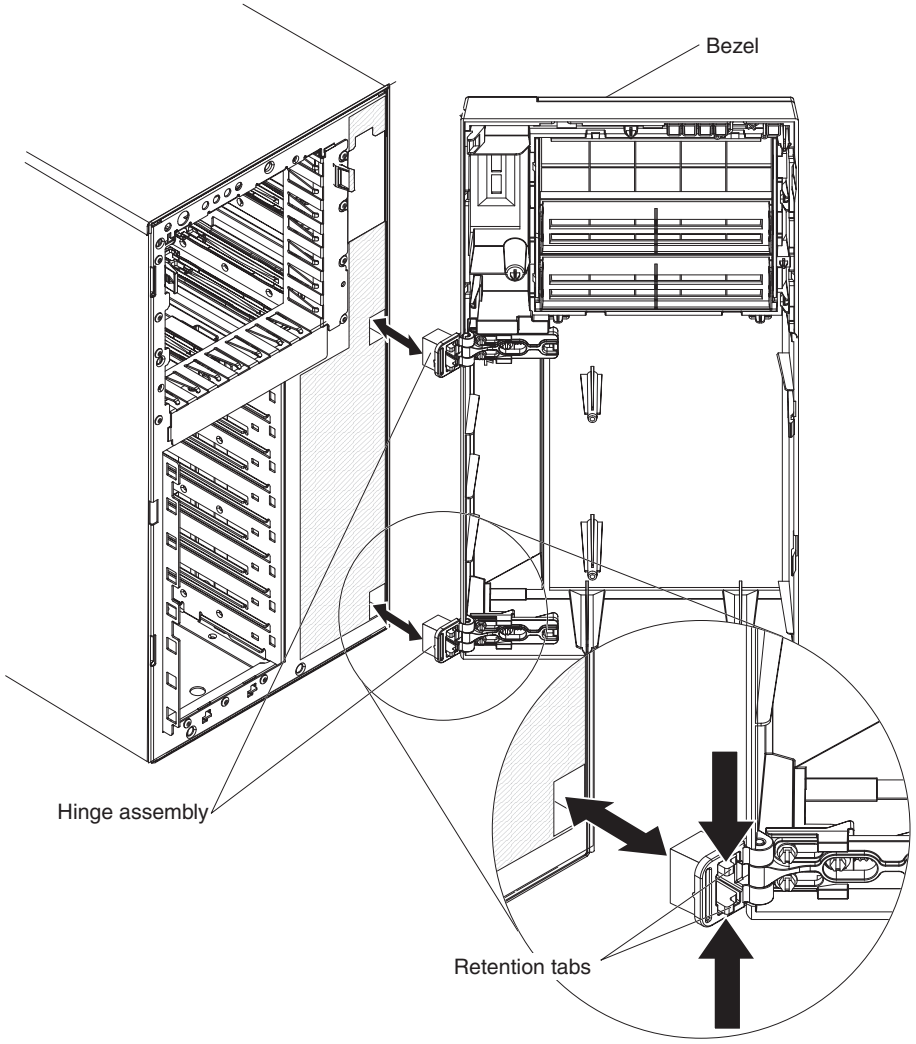
Completing the installation

To complete the installation, you must replace the bezel, reinstall the side cover, and connect all the cables and, for certain options, run the Configuration/Setup Utility program. Follow the instructions in this section.

Replacing the bezel

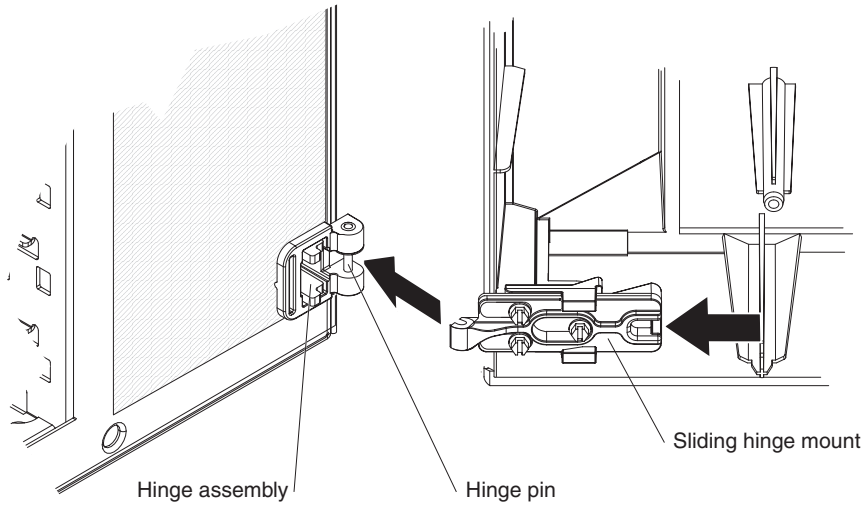
To replace the bezel, complete the following steps:

1. Align the hinge assembly with the hinge holes on the chassis.



2. Push the hinges into the holes on the chassis until they snap into place.
3. If however, the bezel was removed by detaching the sliding hinge mount from the hinge assembly (using the breakaway method as the bezel was designed to do), complete the following steps to reattach the bezel:

a. Press in on the rear of the sliding hinge mount until it extends beyond the edge of the bezel and hold it in place.



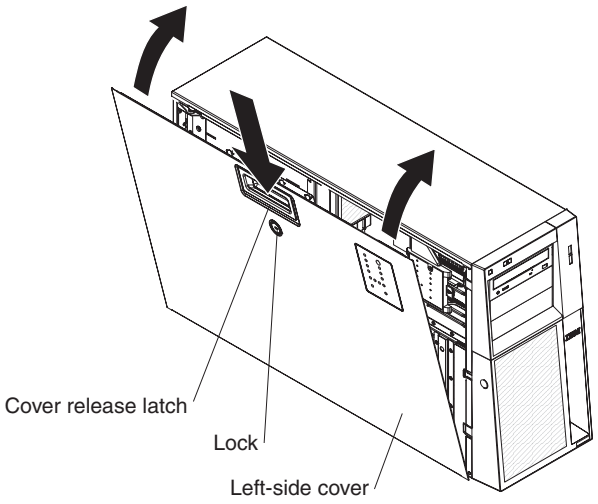
b. Align the sliding hinge mount with the hinge pin on the hinge assembly on the chassis.

c. Press the sliding hinge mount against the hinge pin until the sliding hinge mount snaps onto the hinge pin.

4. Close the bezel.

Replacing the side cover

If you removed the side cover, reinstall it.



To reinstall the side cover, complete the following steps:

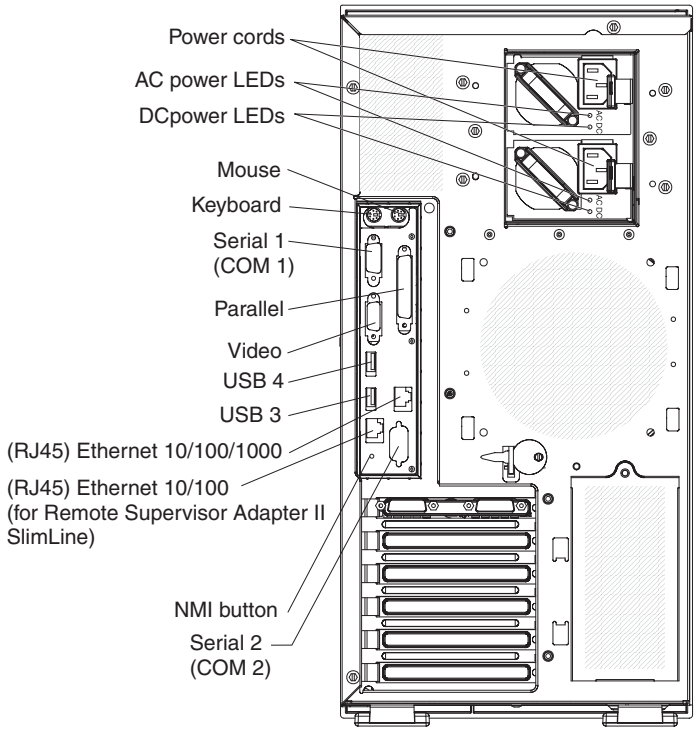
1. Make sure that all cables, adapters, and other components are installed and seated correctly and that you have not left loose tools or parts inside the server. Also, make sure that all internal cables are correctly routed.
2. Insert the bottom edges of the cover into the inside of the chassis and rotate the cover toward the server.
3. Press down on the cover-release latch and close the cover to secure it in place.
4. Lock the side cover.

Connecting the cables

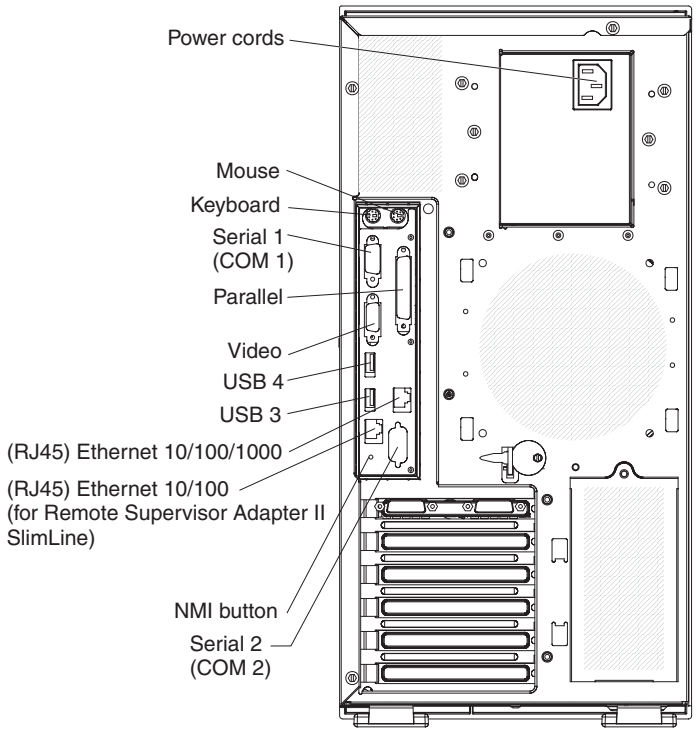
Attention: To prevent damage to equipment, connect the power cords last.

If the server cables and connector panel have color-coded connections, match the color of the cable end with the color of the connector. For example, match a blue cable end with a blue panel connector, a red cable end with a red connector, and so on.

The following illustration shows the input/output (I/O) connectors on the rear of the hot-swap power supply models with optional redundant power.



The following illustration shows the input/output (I/O) connectors on the rear of the non-hot-swap power supply models.



Updating the server configuration

When you start the server for the first time after you add or remove an internal option or an external device, you might receive a message that the configuration has changed. The Configuration/Setup Utility program starts automatically so that you can save the new configuration settings. For additional information, see “Using the Configuration/Setup Utility program” on page 76.

Some options have device drivers that you must install. For information about installing device drivers, see the documentation that comes with each option.

If the server has a ServeRAID adapter and you have installed or removed a hard disk drive, see the ServeRAID documentation that comes with the server for information about reconfiguring the disk arrays.

If you have installed an optional Remote Supervisor Adapter II SlimLine to manage the server remotely, see the Remote Supervisor Adapter II SlimLine documentation that comes with adapter for information about setting up, configuring, and using the adapter.

Connecting external devices

If you install a supported optional adapter, you can attach external devices to the server.

To attach an external device, complete the following steps:

1. Read the safety information that begins on page v, “Installation guidelines” on page 22, and the documentation that comes with the device.
2. Turn off the server and all attached devices.
3. Follow the instructions that come with the device to prepare it for installation and to connect it to the server.

Installing the server in a rack

To convert the server from a tower model to a rack model, you must use a Tower-to-Rack Kit. You can then install the server in a rack cabinet. To order a Tower-to-Rack Kit for the server, contact your IBM marketing representative or authorized reseller.

Chapter 3. Configuring the server

The following configuration programs and utilities come with the server:

- **Configuration/Setup Utility program**

  The Configuration/Setup Utility program is part of the basic input/output system (BIOS) code. Use it to configure serial port assignments, change interrupt request (IRQ) settings, change the startup-device sequence, set the date and time, and set passwords. For information about using this utility program, see “Using the Configuration/Setup Utility program” on page 76.

- **IBM *ServerGuide Setup and Installation* CD**

  The ServerGuide program provides software-setup tools and installation tools that are designed for the server. Use this CD during the installation of the server to configure basic hardware features, such as an integrated SATA controller with RAID capabilities, and to simplify the installation of the operating system. For information about using this CD, see “Using the ServerGuide Setup and Installation CD” on page 81.

- **Boot Menu program**

  The Boot Menu program is part of the BIOS code. Use it to override the startup sequence that is set in the Configuration/Setup Utility program and temporarily assign a device to be first in the startup sequence.

- **Broadcom Gigabit Ethernet Utility program**

  The Broadcom Gigabit Ethernet Utility program is part of the BIOS code. You can use it to configure the network as a startable device, and you can customize where the network startup option appears in your startup sequence. Enable the Broadcom Gigabit Ethernet Utility from the Configuration/Setup Utility program. For information, see “Enabling the Broadcom Gigabit Ethernet Utility program” on page 83.

- **Ethernet controller configuration**

  For information about configuring the Ethernet controller, see “Configuring the Broadcom Gigabit Ethernet controller” on page 83.

- **IBM Director**

  IBM Director is a workgroup-hardware-management tool that you can use to centrally manage servers. If you plan to use IBM Director to manage the server, you must check for the latest applicable IBM Director updates and interim fixes. For information about updating IBM Director, see “Updating IBM Director” on page 84. For more information about IBM Director, see the IBM Director documentation on the *IBM Director* CD.

- **RAID configuration programs**
  - **IBM ServeRAID Configuration Utility program**

    Use the IBM ServeRAID Configuration Utility program to configure devices that are attached to the onboard SAS/SATA controller. For information about using this program, see “Configuring hot-swap SAS, hot-swap SATA, or Simple-swap SATA (some models) RAID” on page 85.

  - **Adaptec® RAID (HostRAID™) Configuration Utility program**

    Use the Adaptec RAID Configuration Utility program to configure the integrated SATA controller with integrated RAID and the devices that are attached to it. For more information about using this utility program, see “Configuring simple-swap SATA RAID” on page 87.

  - **ServeRAID Manager**

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ServeRAID Manager is available as a stand-alone program and as an IBM Director extension. If a ServeRAID controller is installed in the server, use ServeRAID Manager to define and configure the disk-array subsystem *before* you install the operating system. For information about using this program, see “Using ServeRAID Manager” on page 88.

- **Remote Supervisor Adapter II SlimLine**

  For information about setting up and cabling a Remote Supervisor Adapter II SlimLine, see“Remote Supervisor Adapter II SlimLine” on page 90.

- **Baseboard Management Controller Utility programs**

  Use these programs to configure the basement management controller, to update the firmware and sensor data record/field replaceable unit (SDR/FRU) data, and to remotely manage a network. See “Using the baseboard management controller” on page 92.

Using the Configuration/Setup Utility program

Use the Configuration/Setup Utility program to perform the following tasks:

- View configuration information
- View and change assignments for devices and I/O ports
- Set the date and time
- Set and change passwords and Remote Control Security settings
- Set the startup characteristics of the server and the order of startup devices
- Set and change settings for advanced hardware features
- Set and change settings for the baseboard management controller (BMC)
- View and clear error logs

Starting the Configuration/Setup Utility program

To start the Configuration/Setup Utility program, complete the following steps:

1. Turn on the server.
2. When the prompt `Press F1 for Configuration/Setup` appears, press F1. If you have set both a power-on password and an administrator password, you must type the administrator password to access the full Configuration/Setup Utility menu. If you do not type the administrator password, a limited Configuration/Setup Utility menu is available.
3. Select settings to view or change.

Configuration/Setup Utility menu choices

The following choices are on the Configuration/Setup Utility main menu. Depending on the version of the BIOS code, some menu choices might differ slightly from these descriptions.

- **System Summary**

  Select this choice to view configuration information, including the type, speed, and cache sizes of the microprocessors and the amount of installed memory. When you make configuration changes through other options in the Configuration/Setup Utility program, the changes are reflected in the system summary; you cannot change settings directly in the system summary.

  This choice is on the full and limited Configuration/Setup Utility menu.

  – **Processor Summary**

    Select this choice to view the processor information, including the type, speed, and cache size of the microprocessor.

- **System Information**

  Select this choice to view information about the server. When you make changes through other options in the Configuration/Setup Utility program, some of those changes are reflected in the system information; you cannot change settings directly in the system information.

  This choice is on the full Configuration/Setup Utility menu only.

- **Devices and I/O Ports**

  Select this choice to view or change assignments for devices and input/output (I/O) ports.

  Select this choice to enable or disable integrated Ethernet controllers and all standard ports (such as serial, USB, and parallel). **Enable** is the default setting for all controllers. If you disable a device, it cannot be configured, and the operating system will not be able to detect it (this is equivalent to disconnecting the device). If you disable the integrated Ethernet controller and no Ethernet adapter is installed, the server will have no Ethernet capability. If you disable the integrated USB controller, the server will have no USB capability; to maintain USB capability, make sure that **Enabled** is selected for the **USB Support** and **USB 2.0 Support** options.

  If the server is a SATA model, select this choice to configure the SATA ports.

  Select this choice to enable and configure serial remote video and keyboard redirection, and to set other remote console values.

  This choice is on the full Configuration/Setup Utility menu only.

  – **Parallel Port Setup**

    Select this choice to enable or disable the parallel port and to adjust the parallel port resources and features.

  – **Remote Console Redirection**

    Select this choice to enable and configure serial remote video and keyboard redirection.

  – **System MAC Address**

    Select this choice to view the MAC address for the network devices that are installed in the server.

  – **Advanced Chipset Control**

    Select this choice to modify settings that control features of the core chip set on the system board.

    Attention: Do not make changes in the **Advanced Chipset Control** option unless you are directed to do so by an IBM authorized service representative.

  – **Video**

    Select this choice to view the video information.

- **Date and Time**

  Select this choice to set the date and time in the server, in 24-hour format (*hour*:*minute*:*second*).

- **System Security**

  Select this choice to set password settings. See “Passwords” on page 80 for more information about passwords. You can also enable the chassis-intrusion detector to alert you each time that the server cover is removed.

  – **Administrator Password**

    This choice is on the Configuration/Setup Utility menu.

    Select this choice to set, change, or delete an administrator password. An administrator password is intended to be used by a system administrator; it

limits access to the full Configuration/Setup Utility menu. If an administrator password is set, the full Configuration/Setup Utility menu is available only if you type the administrator password at the password prompt. For more information, see “Administrator password” on page 80.

– **Power-on Password**

Select this choice to set or change a power-on password. See “Power-on password” on page 80 for more information.

- **Start Options**

Select this choice to view or change the start options. Changes in the start options take effect when you restart the server.

You can set keyboard operating characteristics and you can specify whether the server starts with the keyboard number lock on or off. You can enable the server to run without a diskette drive, monitor, or keyboard.

This choice is on the full Configuration/Setup Utility menu only.

– **Startup Sequence Options**

The startup sequence specifies the order in which the server checks devices to find a boot record. The server starts from the first boot record that it finds. If the server has Wake on LAN hardware and software and the operating system supports Wake on LAN functions, you can specify a startup sequence for the Wake on LAN functions. You can also specify whether an integrated controller or a PCI adapter has boot precedence.

If you enable the boot fail count, the BIOS default settings will be restored after three consecutive failures to find a boot record.

- **Advanced Setup**

Select this choice to change settings for advanced hardware features.

Important: The server might malfunction if these options are incorrectly configured. Follow the instructions on the screen carefully.

This choice is on the full Configuration/Setup Utility menu only.

– **CPU Options**

Select this choice to enable or disable Hyper-Threading, the pre-fetch queue, C1 enhanced mode, and no-execute mode memory protection.

The default setting for Hyper-Threading is **Enabled**.

– **PCI Bus Control**

Select this choice to view the system resources that are used by the installed PCI, PCI Express, or PCI-X devices.

– **IPMI**

Select this choice to view or clear the system event log. Make changes to the serial/modem device commands, the POST watchdog settings and to view the LAN settings.

- **IPMI Specification Version**

This is a nonselectable menu item that displays the IPMI and BMC versions.

- **BMC Hardware/Firmware Version**

This is a nonselectable menu item that displays the BMC firmware version.

- **Clear System Event Log**

Select this choice to enable or disable the clearing of the BMC system event log. If system event log clearing is enabled, it will reset to disabled once the BMC system-event log is cleared. **Disabled** is the default setting.

- **Existing Event Log number**
  This is a nonselectable menu item that displays the number of entries in the system-event log.
- **BIOS POST Watchdog**
  Select this choice to enable or disable the BMC POST watchdog. **Disabled** is the default setting.
- **POST Watchdog Timeout**
  Set the BMC POST watchdog timeout value. **5 minutes** is the default setting.
- **System Event Log**
  Select this choice to view the BMC system-event log, which contains all system error and warning messages that have been generated. Use the arrow keys to move between pages in the log. Run the diagnostic program to get more information about error codes that occur. For instructions, see the diagnostic information in the *Problem Determination and Service Guide* on the IBM *System x3400 Documentation* CD. Select **Clear System Event Log** to clear the BMC system-event log.

  Important: If the system-error LED on the front of the server is lit but there are no other error indications, clear the BMC system-event log. Also, after you complete a repair or correct an error, clear the BMC system-event log to turn off the system-error LED on the front of the server.
- **Serial /Modem Device Commands**

  Select this choice to view the Serial/Modem Device Commands.
- **LAN Settings**
  Select this choice to view the baseboard management controller (BMC) network configuration information.

– **NMI Options**

  Select this choice to enable or disable the NMI reboot. **Enabled** is the default.

• **Error Logs**

  Select this choice to view or clear error logs.

  – **POST Error Log**

    Select this choice to view the three most recent error codes and messages that the system generated during POST. Select **Clear error logs** to clear the POST error log. See also IPMI on page 78 for more information on error logs.

  – **System Event/Error Log**

    Select this choice to view the error codes and messages that the system generated during POST and all system status messages from the service processor. Select **Clear error logs** to clear the system-event/error log and the IPMI error log. For more information on error logs, see IPMI on page 78.

    Important: If the system-error LED on the front of the server is lit but there are no other error indications, clear the system-event/error log. This log does not clear itself, and if it begins to fill up, the system-error LED will be lit. Also, after you complete a repair or correct an error, clear the system-event/error log to turn off the system-error LED on the front of the server.

• **Save Settings**

  Select this choice to save the changes that you have made in the settings.

• **Restore Settings**

  Select this choice to cancel the changes that you have made in the settings and restore the previous settings.

• **Load Default Settings**

Select this choice to cancel the changes that you have made in the settings and restore the factory settings.

- **Exit Setup**

  Select this choice to exit from the Configuration/Setup Utility program. If you have not saved the changes that you have made in the settings, you are asked whether you want to save the changes or exit without saving them.

Passwords

From the **System Security** choice, you can set, change, and delete a power-on password and an administrator password. The **System Security** choice is on the full Configuration/Setup menu only.

If you set only a power-on password, you must type the power-on password to complete the system startup and to have access to the full Configuration/Setup Utility menu.

An administrator password is intended to be used by a system administrator; it limits access to the full Configuration/Setup Utility menu. If you set only an administrator password, you do not have to type a password to complete the system startup, but you must type the administrator password to access the Configuration/Setup Utility menu.

If you set a power-on password for a user and an administrator password for a system administrator, you can type either password to complete the system startup. A system administrator who types the administrator password has access to the full Configuration/Setup Utility menu; the system administrator can give the user authority to set, change, and delete the power-on password. A user who types the power-on password has access to only the limited Configuration/Setup Utility menu; the user can set, change, and delete the power-on password, if the system administrator has given the user that authority.

Power-on password

If a power-on password is set, when you turn on the server, the system startup will not be completed until you type the power-on password. You can use any combination of up to seven characters (A–Z, a–z, and 0–9) for the password.

When a power-on password is set, you can enable the Unattended Start mode, in which the keyboard and mouse remain locked but the operating system can start. You can unlock the keyboard and mouse by typing the power-on password.

If you forget the power-on password, you can regain access to the server in any of the following ways:

- If an administrator password is set, type the administrator password at the password prompt. Start the Configuration/Setup Utility program and reset the power-on password.
- Remove the server battery and then reinstall it. For instructions for removing the battery, see the *Problem Determination and Service Guide* on the IBM *System x3400 Documentation* CD.
- Change the switch position of the clear CMOS switch (SW4) on the system board to bypass the power-on password check.

Administrator password

If an administrator password is set, you must type the administrator password for access to the full Configuration/Setup Utility menu. You can use any combination of

up to seven characters (A–Z, a–z, and 0–9) for the password. The **Administrator Password** choice is on the Configuration/Setup Utility menu only if an optional IBM Remote Supervisor Adapter II SlimLine is installed.

Resetting passwords

If you forget the power-on password or administrator password, you can change the switch position of the clear CMOS switch (SW4) on the system board to bypass the power-on password and administrator password check. This enables you to reset the power-on password and administrator password.

Using the ServerGuide Setup and Installation CD

The *ServerGuide Setup and Installation* CD contains a setup and installation program that is designed for your server. The ServerGuide program detects the server model and hardware options that are installed and uses that information during setup to configure the hardware. The ServerGuide program simplifies operating-system installations by providing updated device drivers and, in some cases, installing them automatically.

You can download a free image of the *ServerGuide Setup and Installation* CD, or you can purchase the CD. To download the image, go to the IBM ServerGuide Web page at http://www.ibm.com/pc/qtechinfo/MIGR-4ZKPPT.html. To purchase the latest *ServerGuide Setup and Installation* CD, go to the ServerGuide fulfillment Web site at http://www.ibm.com/servers/eserver/xseries/systems_management/sys_migration/serverguide/sub.html.

The ServerGuide program has the following features:

- An easy-to-use interface
- Diskette-free setup, and configuration programs that are based on detected hardware
- ServeRAID Manager program, which configures your ServeRAID adapter or integrated SAS or SATA controller with RAID capabilities
- Device drivers that are provided for the server model and detected hardware
- File-system type that is selectable during setup

ServerGuide features

Features and functions can vary slightly with different versions of the ServerGuide program. To learn more about the version that you have, start the *ServerGuide Setup and Installation* CD and view the online overview. Not all features are supported on all server models.

The ServerGuide program requires a supported IBM server with an enabled startable (bootable) CD or DVD drive. In addition to the *ServerGuide Setup and Installation* CD, you must have the operating-system CD to install the operating system.

The ServerGuide program performs the following tasks:

- Sets system date and time
- Detects an installed RAID adapter or controller and runs the RAID configuration program
- Checks the microcode (firmware) levels of a ServeRAID adapter and determines whether a later level is available from the CD
- Detects installed hardware options and provides updated device drivers for most adapters and devices

- Provides diskette-free installation for supported Windows operating systems
- Includes an online readme file with links to tips for your hardware and operating system installation

Setup and configuration overview

When you use the *ServerGuide Setup and Installation* CD, you do not need setup diskettes. You can use the CD to configure any supported IBM server model. The setup program provides a list of tasks that are required to set up the server model. On a server with a ServeRAID adapter or integrated SATA controller with RAID capabilities, you can run the RAID configuration programs to create logical drives.

Note: Features and functions can vary slightly with different versions of the ServerGuide program.

When you start the *ServerGuide Setup and Installation* CD, the program prompts you to complete the following tasks:

- Select your language.
- Select your keyboard layout and country.
- View the overview to learn about ServerGuide features.
- View the readme file to review installation tips for your operating system and adapter.
- Start the operating-system installation. You will need your operating-system CD.

Typical operating system installation

The ServerGuide program can reduce the time it takes to install an operating system. It provides the device drivers that are required for your hardware and for the operating system that you are installing. This section describes a typical ServerGuide operating-system installation.

Note: Features and functions can vary slightly with different versions of the ServerGuide program.

1. After you have completed the setup process, the operating-system installation program starts. (You will need your operating-system CD to complete the installation.)
2. The ServerGuide program stores information about the server model, service processor, hard disk drive controllers, and network adapters. Then, the program checks the CD for newer device drivers. This information is stored and then passed to the operating-system installation program.
3. The ServerGuide program prompts you to insert your operating-system CD and restart the server. At this point, the installation program for the operating system takes control to complete the installation.

Installing your operating system without ServerGuide

If you have already configured the server hardware and you are not using the ServerGuide program to install your operating system, complete the following steps to download the latest operating-system installation instructions from the IBM Web site:

Note: Changes are made periodically to the IBM Web site. The actual procedure might vary slightly from what is described in this document.

1. Go to http://www.ibm.com/support/.

2. Under **Search technical support**, type 7973, 7974, 7975 or 7976 (depending on the machine type for your server model), and click **Search**.
3. Select the instructions for your operating system.

Using the Boot Menu program

The Boot Menu program is a built-in, menu-driven configuration program that you can use to temporarily redefine the first startup device without changing settings in the Configuration/Setup Utility program.

To use the Boot Menu program, complete the following steps:

1. Turn off the server.
2. Restart the server.
3. Press F12.
4. Select the startup device.

The next time that the server is started, it returns to the startup sequence that is set in the Configuration/Setup Utility program.

Enabling the Broadcom Gigabit Ethernet Utility program

The Broadcom Gigabit Ethernet Utility is part of the BIOS code. You can use it to configure the network as a startable device, and you can customize where the network startup option appears in the startup sequence.

To enable the Broadcom Gigabit Ethernet Utility program, complete the following steps:

1. From the Configuration/Setup Utility main menu, select **Devices and I/O Ports** and press Enter.
2. Select **Planar Ethernet** and use the Right Arrow (→) key to set it to **Enabled**.
3. Select **Save Settings** and press Enter.

Configuring the Broadcom Gigabit Ethernet controller

The Ethernet controller is integrated on the system board. It provides an interface for connecting to a 10-Mbps, 100-Mbps, or 1-Gbps network and provides full duplex (FDX) capability, which enables simultaneous transmission and reception of data on the network. If the Ethernet port in the server supports auto-negotiation, the controller detects the data-transfer rate (10BASE-T, 100BASE-TX, or 1000BASE-T) and duplex mode (full-duplex or half-duplex) of the network and automatically operates at that rate and mode.

You do not have to set any jumpers or configure the controller. However, you must install a device driver to enable the operating system to address the controller. To find updated information about configuring the controller, complete the following steps.

Note: Changes are made periodically to the IBM Web site. The actual procedure might vary slightly from what is described in this document.

1. Go to http://www.ibm.com/support/.
2. Under **Search technical support**, type 7973, 7974, 7975, or 7976 (depending on the machine type for your server model), and click **Search**.
3. In the **Additional search terms** field, type ethernet, and click **Go**.

Updating IBM Director

If you plan to use IBM Director to manage the server, you must check for the latest applicable IBM Director updates and interim fixes.

To install the IBM Director updates and any other applicable updates and interim fixes, complete the following steps.

Note: Changes are made periodically to the IBM Web site. The actual procedure might vary slightly from what is described in this document.

1. Check for the latest version of IBM Director:
   a. Go to http://www.ibm.com/servers/eserver/xseries/systems_management/xseries_sm/dwnl.html.
   b. If the drop-down list shows a newer version of IBM Director than what comes with the server, follow the instructions on the Web page to download the latest version.
2. Install the IBM Director program.
3. Download and install any applicable updates or interim fixes for the server:
   a. Go to http://www.ibm.com/support/.
   b. Click **Downloads and drivers**.
   c. From the **Category** list, select **xSeries (Intel and AMD processor-based)**.
   d. From the **Sub-category** list, select **System x3400** and click **Continue**.
   e. In the **Search within results** field, type `director` and click **Search**.
   f. Select any applicable update or interim fix that you want to download.
   g. Click the link for the executable (.exe) file to download the file, and follow the instructions in the readme file to install the update or interim fix.
   h. Repeat steps 3f and 3g for any additional updates or interim fixes that you want to install.

Using the RAID configuration programs

Note: RAID options and HostRAID are not supported on the SCO 6.0 and UnixWare 7.14 operating systems.

Use the IBM ServeRAID Configuration Utility program, Adaptec RAID Configuration Utility program, and ServeRAID Manager to configure and manage redundant array of independent disks (RAID). Be sure to use these programs as described in this document.

The ServeRAID 8k-l SAS Controller that comes installed in some models (hot-swap SAS and hot-swap SATA models) enables you to configure multiple physical SAS or SATA hard disk drives to operate as logical drives in a disk array. The server comes with a CD containing the ServeRAID Manager program, which you can use to configure the ServeRAID 8k-l SAS Controller. If your server comes with an operating system installed, such as Microsoft Windows 2000 Datacenter Server, see the software documentation that comes with the server for configuration information.

Use these programs to perform the following tasks:

- Perform a low-level format on a hard disk drive
- View or change IDs for attached devices
- Set protocol parameters on hard disk drives

- Monitor operation of the RAID controller
- Configure a redundant array of independent disks (RAID) array
- View or change the RAID configuration and associated devices

Consider the following information when using the RAID configuration programs to configure and manage arrays:

- The integrated SATA controller (simple-swap SATA models) with integrated SATA RAID (also known as HostRAID) supports RAID level-0 and level-1 when two drives are installed. When the maximum four drives are installed, RAID level-10 is also supported.

  Note: In addition, when the maximum four drives and the optional ServeRAID-8k Controller are installed in the simple-swap models, the server can also support RAID level-5. See “Installing the ServeRAID-8k adapter” on page 57 for details about installing and cabling the ServeRAID-8k Controller to enable RAID level-5 support on simple-swap models.
- The onboard SAS/SATA controller (hot-swap SAS and hot-swap SATA models) supports RAID level-0 and level-1 when two drives and the ServeRAID 8k-l controller are installed. When four drives are installed, RAID level-10 is also supported. When you upgrade to the maximum eight drives and the optional ServeRAID-8k controller is installed, RAID levels 1e, 5, and 6 also are supported.
- You can order an optional IBM ServeRAID-MR10is VAULT SAS/SATA Controller that supports RAID levels 0, 1, 5, 6, 10, 50, and 60. You can install the ServeRAID-MR10is SAS/SATA controller only in server models with eight 3.5 inch hot-swap hard disk drives installed. For instructions on how to install the ServeRAID-MR10is SAS/SATA controller, see “Installing the optional IBM ServeRAID-MR10is VAULT SAS/SATA Controller” on page 60 for instructions on how to install this adapter.

  Note: Note: The onboard RAID controller will be disabled by BIOS when the ServeRAID-MR10is SAS/SATA controller is installed in the server.
- Hard disk drive capacities affect how you create arrays. The drives in an array can have different capacities, but the RAID controller treats them as if they all have the capacity of the smallest hard disk drive.
- To help ensure signal quality, do not mix drives with different speeds and data rates.
- To update the firmware and BIOS code for an optional ServeRAID controller, you must use the IBM *ServeRAID Support* CD that comes with the ServeRAID option.
- If you install a different type of RAID controller in the server, use the method that is described in the instructions that come with the controller to view or change settings for attached devices.

Configuring hot-swap SAS, hot-swap SATA, or Simple-swap SATA (some models) RAID

Note: RAID options are not supported on the SCO 6.0 and UnixWare 7.14 operating systems.

Use the IBM ServeRAID Configuration Utility program to configure and manage redundant array of independent disks (RAID) on the following server models:

- Hot-swap SAS
- Hot-swap SATA

- Simple-swap models with the optional ServeRAID-8k Controller installed

This utility is part of the BIOS code. The IBM ServeRAID Configuration Utility program adds RAID functionality to the onboard SAS/SATA controller. The onboard SAS/SATA controller comes enabled by default.

Using the IBM ServeRAID Configuration Utility program

Use the IBM ServeRAID Configuration Utility to perform the following tasks:

- Configure a redundant array of independent disks (RAID) array
- View or change the RAID configuration and associated devices

For additional information about how to use the IBM ServeRAID Configuration Utility, see the documentation on the IBM *ServeRAID Support* CD.

IBM ServeRAID Configuration Utility menu choices: The following choices are on the IBM ServeRAID Configuration Utility menu:

- **Array Configuration Utility**

  Select this choice to create, manage, or delete arrays, add or delete a hot-spare drive, or initialize drives.
- **SerialSelect Utility**

  Select this choice to configure the controller interface definitions or to configure the physical transfer and SAS or SATA address of the selected drive.
- **Disk Utilities**

  Select this choice to format a disk or verify the disk media. Select a device from the list and read the instructions on the screen carefully before making a selection.

Starting IBM ServeRAID Configuration Utility program: To start the IBM ServeRAID Configuration Utility program, complete the following steps:

1. Turn on the server.
2. When the message `Press <CTRL><A> for IBM ServeRAID Configuration Utility` appears, press Ctrl+A. If you have set an administrative password, you are prompted to type the password.
3. To select a choice from the menu, use the arrow keys to highlight it and press Enter.

Creating a RAID array

To use the IBM ServeRAID Configuration Utility to configure a RAID level-1 array, complete the following steps:

1. From the IBM ServeRAID Configuration Utility program menu, select **Array Configuration Utility**.
2. Select **Create Array**.
3. From the list of ready drives, select the two drives that you want to group into the array.
4. When you are prompted to select the RAID type, select **RAID 0** or **RAID-1**.
5. (Optional) Type an identifier for the array.
6. When you are prompted for the array build method, select **Quick Init**.
7. Follow the instructions on the screen to complete the configuration; then, select **Done** to exit.
8. Restart the server.

Viewing the array configuration

To view information about the RAID array, complete the following steps:

1. Start the IBM ServeRAID Configuration Utility program.
2. From the IBM ServeRAID Configuration Utility window, select **Manage Arrays**.
3. Select an array and press Enter.
4. To exit from the program, press Esc.

For additional information about using the IBM ServeRAID Configuration Utility program to create, configure, and manage arrays, see the documentation on the IBM *ServeRAID Support* CD.

Configuring simple-swap SATA RAID

Use the Adaptec RAID Configuration Utility program to configure and manage simple-swap SATA redundant array of independent disks (RAID) on simple-swap SATA models with no ServeRAID adapter installed.

This utility is part of the BIOS code. The Adaptec RAID Configuration Utility program adds RAID functionality to the integrated SATA controller. The integrated Serial ATA (SATA) controller comes disabled by default. You must enable it and install the device drivers before you can use it. The device drivers, documentation, and other information are available on the IBM *ServeRAID-8e (Adaptec HostRAID) Support* CD.

Enabling the Serial ATA (SATA) controller

To enable the SATA RAID controller, complete the following steps:

1. Turn on the server.
2. When the prompt `Press F1 for Configuration/Setup` appears, press F1. If you have set an administrator password, you are prompted to type the password.
3. Select **Devices and I/O Ports --> Advanced Chipset Control**.
4. Select **SATA Controller Mode Option**. Change the value to **Enhanced**.
5. Scroll down and select **SATA RAID Enable**.
6. Select **Enabled**.
7. Press Esc; then, select **Yes** to save the changes.

Using the Adaptec RAID Configuration Utility program

Note: Adaptec RAID (also known as HostRAID) is not supported on the SCO 6.0 and UnixWare 7.14 operating systems.

Use the Adaptec RAID Configuration Utility program to perform the following tasks:

- Configure a redundant array of independent disks (RAID) array
- View or change the RAID configuration and associated devices

For additional information about using the Adaptec RAID Configuration Utility program, see the documentation on the IBM *ServeRAID-8e (Adaptec HostRAID) Support* CD that comes with the server.

Adaptec RAID Configuration Utility menu choices: The following choices are on the Adaptec RAID Configuration Utility menu:

- **Array Configuration Utility**

  Select this choice to create, manage, or delete arrays, add or delete a hot-spare drive, or initialize drives.

- **SerialSelect Utility**

  Select this choice to configure the controller interface definitions or to configure the physical transfer and SATA address of the selected drive.
- **Disk Utilities**

  Select this choice to format a disk or verify the disk media. Select a device from the list and read the instructions on the screen carefully before making a selection.

Starting the Adaptec RAID Configuration Utility program: To start the Adaptec RAID Configuration Utility program, complete the following steps:

1. Turn on the server.
2. When the prompt `Press <CTRL><<A> for Adaptec RAID Configuration Utility` appears, press Ctrl+A.
3. To select a choice from the menu, use the arrow keys to highlight it and press Enter.

Creating a RAID array

To use the Adaptec RAID Configuration Utility program to configure a RAID level-1 array, complete the following steps:

1. Start the Adaptec RAID Configuration Utility program.
2. Select **Array Configuration Utility**.
3. Select **Create Array**.
4. From the list of ready drives, select the two drives that you want to group into the array.
5. When you are prompted to select the RAID level, select **RAID 0** or **RAID-1**.
6. (Optional) Type an identifier for the array.
7. When you are prompted for the array build method, select **Quick Init**.
8. Follow the instructions on the screen to complete the configuration, and select **Done** to exit.
9. Restart the server.

Viewing the array configuration

To view information about the RAID array, complete the following steps:

1. Start the Adaptec RAID Configuration Utility program.
2. Start the Array Configuration Utility.
3. From the Array Configuration Utility window, select **Manage Arrays**.
4. Select an array and press Enter.
5. Press Esc to exit from the program.

For additional information about using the Adaptec RAID Configuration Utility program to create, configure, and manage arrays, see the documentation on the IBM *ServeRAID-8e (Adaptec HostRAID) Support* CD.

Using ServeRAID Manager

Important: RAID options and HostRAID are not supported on the SCO 6.0 and UnixWare 7.14 operating systems.

Use ServeRAID Manager, which is on the IBM *ServeRAID Manager Application* CD, to perform the following tasks:

- Configure a redundant array of independent disks (RAID) array

- Restore a SAS or SATA hard disk drive to the factory-default settings, erasing all data from the disk
- View the RAID configuration and associated devices
- Monitor the operation of the RAID controllers

To perform some tasks, you can run ServeRAID Manager as an installed program. However, to configure the integrated RAID controller or the installed ServeRAID controller and perform an initial RAID configuration on the server, you must run ServeRAID Manager in Startable CD mode, as described in the instructions in this section. If you install a different type of RAID adapter in the server, use the method that is described in the instructions that come with the adapter to view or change settings for attached devices.

See the ServeRAID documentation on the IBM *ServeRAID Support* CD for additional information about RAID technology and instructions for using ServeRAID Manager to configure the RAID controller. Additional information about ServeRAID Manager is also available from the **Help** menu. For information about a specific object in the ServeRAID Manager tree, select the object and click **Actions → Hints and tips.**

Configuring the controller

By running ServeRAID Manager in Startable CD mode, you can configure the controller before you install the operating system. The information in this section assumes that you are running ServeRAID Manager in Startable CD mode.

To run ServeRAID Manager in Startable CD mode, turn on the server; then, insert the IBM *ServeRAID Support* CD into the CD or DVD drive. If ServeRAID Manager detects an unconfigured controller and ready drives, the Configuration wizard starts.

In the Configuration wizard, you can select express configuration or custom configuration. Express configuration automatically configures the controller by grouping the first two physical drives in the ServeRAID Manager tree into an array and creating a RAID level-1 logical drive. If you select custom configuration, you can select the two physical drives that you want to group into an array and create a hot-spare drive.

Using express configuration: To use express configuration, complete the following steps:

1. In the ServeRAID Manager tree, click the controller.
2. From the toolbar, click **Create**.
3. Click **Express configuration**.
4. Click **Next**.
5. In the “Configuration summary” window, review the information. To change the configuration, click **Modify arrays** or **Modify logical drives**.

   Note: Some operating systems have size limitations for logical drives. Before you save the configuration, make sure that the size of the logical drive is appropriate for your operating system.
6. Click **Apply**; when you are asked whether you want to apply the new configuration, click **Yes**. The configuration is saved in the controller and in the physical drives.
7. Exit from ServeRAID Manager and remove the CD from the CD or DVD drive.
8. Restart the server.

Using custom configuration: To use custom configuration, complete the following steps:

1. In the ServeRAID Manager tree, click the controller.
2. Click **Custom configuration**.
3. Click **Next**.
4. In the “Create arrays” window, from the list of ready drives, select the two drives that you want to group into the array.
5. Click the (Add selected drives) icon to add the drives to the array.
6. If you want to configure a hot-spare drive, complete the following steps:
   a. Click the **Spares** tab.
   b. Select the physical drive that you want to designate as the hot-spare drive, and click the icon to add the drive.
7. Click **Next**.
8. In the “Configuration summary” window, review the information. To change the configuration, click **Back**.
9. Click **Apply**; when you are asked whether you want to apply the new configuration, click **Yes**. The configuration is saved in the controller and in the physical drives.
10. Exit from ServeRAID Manager, and remove the CD from the CD or DVD drive.
11. Restart the server.

Viewing the configuration

You can use ServeRAID Manager to view information about RAID controllers and the RAID subsystem (such as arrays, logical drives, hot-spare drives, and physical drives). When you click an object in the ServeRAID Manager tree, information about that object appears in the right pane. To display a list of available actions for an object, click the object and click **Actions**.

Remote Supervisor Adapter II SlimLine

You can use an optional Remote Supervisor Adapter II SlimLine to obtain enhanced system management capabilities, beyond those of the integrated baseboard management controller (BMC). The Remote Supervisor Adapter II SlimLine has a dedicated Ethernet connection at the rear of the server.

This section describes how to set up, cable, and configure the Remote Supervisor Adapter II SlimLine so that you can manage the server remotely.

In addition to the information in this section, see the IBM Remote Supervisor Adapter II SlimLine documentation for information about how to configure and use the Remote Supervisor Adapter II SlimLine to manage the server remotely through the Web-based interface or the text-based interface.

Note: The Web-based interface and text-based interface do not support double-byte character set (DBCS) languages.

Requirements

Make sure that the following requirements are met:

- The Web interface Remote Disk function requires the client system to be running Microsoft Windows 2000 or later. The Web interface Remote Control features require the Java™ 1.4 Plug-in or later. The following Web browsers are supported:
  – Microsoft Internet Explorer version 5.5 or later with the latest Service Pack

  - Netscape Navigator version 7.0 or later
  - Mozilla version 1.3 or later
- If you plan to configure Simple Network Management Protocol (SNMP) trap alerts on the Remote Supervisor Adapter II SlimLine, install and compile the management information base (MIB) on your SNMP manager.
- You will need an Internet connection to the client system to download software and firmware from the IBM Support Web site during the installation process. The Remote Supervisor Adapter II SlimLine firmware and the SNMP MIB are available on the *ServerGuide Setup and Installation* CD; the latest versions are available at http://www.ibm.com/servers/eserver/support/xseries/index.html.

Cabling the Remote Supervisor Adapter II SlimLine

You can manage the server remotely through the Remote Supervisor Adapter II SlimLine by using the dedicated systems-management Ethernet connector on the rear of the server.

For additional information about network configuration, see the Remote Supervisor Adapter II SlimLine documentation.

To cable the Remote Supervisor Adapter II SlimLine, complete the following steps:

1. Connect one end of a Category 3 or Category 5 Ethernet cable to the dedicated systems-management Ethernet connector. See “Rear view” on page 13 for the location of the Remote Supervisor Adapter II SlimLine connector.
2. Connect the other end of the cable to the network.

Installing the Remote Supervisor Adapter II SlimLine firmware

The software and firmware files that you need are contained in one system service package installation kit. The kit contains the following files:

- Software and firmware installation instructions
- BIOS code update with support for the Remote Supervisor Adapter II SlimLine
- Diagnostics code update
- Remote Supervisor Adapter II SlimLine device drivers
- Remote Supervisor Adapter II SlimLine firmware update
- Integrated service processor firmware update
- Video device driver
- Firmware-update utility program

To download and install the software and firmware, complete the following steps.

Note: changes are made periodically to the IBM Web site. The actual procedure might vary slightly from what is described in this document.

1. Go to http://www.ibm.com/servers/eserver/support/xseries/index.html.
2. From the **Hardware** list, select **System x3400** and click **Go**.
3. Click the **Download** tab.
4. Select the system service package for the operating system that is running on the server in which the Remote Supervisor Adapter II SlimLine is installed.
5. Click the file link to download the system service package to *d*:\ibmssp, where *d* is the hard disk drive letter. (Create the directory if necessary.)
6. Extract the files into *d*:\ibmssp. See the readme.txt file, which is included with the extracted files, for a list of the files in the package.

7. Follow the instructions in *Remote Supervisor Adapter II Installation Instructions*, which is in Portable Document Format (PDF) in *d*:\ibmssp, to install the software and firmware.
8. Restart the server after the software and firmware are installed.

Completing the setup

See the *IBM Remote Supervisor Adapter II User's Guide* on the IBM *System x3400 Documentation* CD for instructions for completing the configuration, including the following procedures:

- Configuring the Ethernet ports
- Defining login IDs and passwords
- Selecting the events that will receive alert notifications
- Monitoring remote server status, using the Remote Supervisor Adapter II SlimLine Web-based interface
- Controlling the server remotely
- Attaching a remote diskette drive, CD drive, or disk image to the server

After you configure the adapter, use the Web-based interface to create a backup copy of the configuration so that you can restore the configuration, if you have to replace the adapter. For more information, see the *Remote Supervisor Adapter II User's Guide*.

Using the baseboard management controller

The baseboard management controller (BMC) provides environmental monitoring for the server. If environmental conditions exceed thresholds or if system components fail, the baseboard management controller lights LEDs to help you diagnose the problem and also records the error in the System Event/Error log.

The baseboard management controller also provides the following remote server management capabilities through the OSA SMBridge management utility program:

- **Command-line interface (IPMI Shell)**

  The command-line interface provides direct access to server management functions through the IPMI protocol. Use the command-line interface to issue commands to control the server power, view system information, and identify the server. You can also save one or more commands as a text file and run the file as a script.
- **Serial over LAN**

  Establish a Serial over LAN (SOL) connection to manage servers from a remote location. You can remotely view and change the BIOS settings, restart the server, identify the server, and perform other management functions. Any standard Telnet client application can access the SOL connection.

Enabling and configuring SOL using the OSA SMBridge management utility program

To enable and configure the server for SOL by using the OSA SMBridge management utility program, you must update and configure the BIOS code; update and configure the baseboard management controller (BMC) firmware; update and configure the Ethernet controller firmware; and enable the operating system for an SOL connection.

BIOS update and configuration

Complete the following steps to update and configure the BIOS code to enable SOL:

1. Update the BIOS code:
   a. Download the latest version of the BIOS code from http://www.ibm.com/support/.
   b. Update the BIOS code, following the instructions that come with the update file that you downloaded.
2. Update the BMC firmware:
   a. Download the latest version of the BMC firmware from http://www.ibm.com/support/.
   b. Update the BMC firmware, following the instructions that come with the update file that you downloaded.
3. Configure the BIOS settings:
   a. Restart the server and press F1 when prompted to start the Configuration/Setup Utility program.
   b. Select **Devices and I/O Ports**; then, make sure that the values are set as follows:
      - **Serial Port A**: Auto-configure
      - **Serial Port B**: Auto-configure
   c. Select **Remote Console Redirection**; then, make sure that the values are set as follows:
      - **Remote Console COM Port**: COM 2
      - **Remote Console Baud Rate**: 19200 or higher
      - **Remote Console Connection Type**: VT100
      - **Remote Console Connect**: Direct
      - **Remote Console Flow Control**: Hardware
      - **Remote Console Active After Boot**: Enabled
   d. Press Esc twice to exit the **Remote Console Redirection** and **Devices and I/O Ports** sections of the Configuration/Setup Utility program.
   e. Select **Advanced Setup**; then, select **Baseboard Management Controller (BMC) Settings**.
   f. Set **BMC Serial Port Access Mode** to **Dedicated**.
   g. Press Esc twice to exit the **Baseboard Management Controller (BMC) Settings** and **Advanced Setup** sections of the Configuration/Setup Utility program.
   h. Select **Save Settings**; then, press Enter.
   i. Press Enter to confirm.
   j. Select **Exit Setup**; then, press Enter.
   k. Make sure that **Yes, exit the Setup Utility** is selected; then, press Enter.

Linux configuration

For SOL operation on the server, you must configure the Linux operating system to expose the Linux initialization (booting) process. This enables users to log in to the Linux console through an SOL session and directs Linux output to the serial console. See the documentation for your specific Linux operating-system type for information and instructions.

Use one of the following procedures to enable SOL sessions for your Linux operating system. You must be logged in as a root user to perform these procedures.

Red Hat Enterprise Linux ES 2.1 configuration:

Note: This procedure is based on a default installation of Red Hat Enterprise Linux ES 2.1. The file names, structures, and commands might be different for other versions of Red Hat Linux.

Complete the following steps to configure the general Linux parameters for SOL operation when using the Red Hat Enterprise Linux ES 2.1 operating system.

Note: Hardware flow control prevents character loss during communication over a serial connection. You must enable it when using a Linux operating system.

1. Add the following line to the end of the `# Run gettys in standard runlevels` section of the /etc/inittab file. This enables hardware flow control and enables users to log in through the SOL console.

   ```
   7:2345:respawn:/sbin/agetty -h ttyS0 19200 vt102
   ```

2. Add the following line at the bottom of the /etc/securetty file to enable a user to log in as the root user through the SOL console:

   ```
   ttyS0
   ```

LILO configuration: If you are using LILO, complete the following steps:

1. Complete the following steps to modify the /etc/lilo.conf file:
   a. Add the following text to the end of the first `default=linux` line

      ```
      -Monitor
      ```

   b. Comment out the `map=/boot/map` line by adding a `#` at the beginning of this line.
   c. Comment out the `message=/boot/message` line by adding a `#` at the beginning of this line.
   d. Add the following line before the first `image=` line:

      ```
      # This will allow you to only Monitor the OS boot via SOL
      ```

   e. Add the following text to the end of the first `label=linux` line:

      ```
      -Monitor
      ```

   f. Add the following line to the first `image=` section. This enables SOL.

      ```
      append="console=ttyS0,19200n8 console=tty1"
      ```

   g. Add the following lines between the two `image=` sections:

      ```
      # This will allow you to Interact with the OS boot via SOL
      image=/boot/vmlinuz-2.4.9-e.12smp
          label=linux-Interact
          initrd=/boot/initrd-2.4.9-e.12smp.img
          read-only
          root=/dev/hda6
          append="console=tty1 console=ttyS0,19200n8 "
      ```

   The following examples show the original content of the /etc/lilo.conf file and the content of this file after modification.

Original /etc/lilo.conf contents

```
prompt
timeout=50
default=linux
boot=/dev/hda
map=/boot/map
install=/boot/boot.b
message=/boot/message
linear
image=/boot/vmlinuz-2.4.9-e.12smp
    label=linux
    initrd=/boot/initrd-2.4.9-e.12smp.img
    read-only
    root=/dev/hda6
image=/boot/vmlinuz-2.4.9-e.12
    label=linux-up
    initrd=/boot/initrd-2.4.9-e.12.img
    read-only
    root=/dev/hda6
```

Modified /etc/lilo.conf contents

```
prompt
timeout=50
default=linux-Monitor
boot=/dev/hda
#map=/boot/map
install=/boot/boot.b
#message=/boot/message
linear
# This will allow you to only Monitor the OS boot via SOL
image=/boot/vmlinuz-2.4.9-e.12smp
    label=linux-Monitor
    initrd=/boot/initrd-2.4.9-e.12smp.img
    read-only
    root=/dev/hda6
    append="console=ttyS0,19200n8 console=tty1"
# This will allow you to Interact with the OS boot via SOL
image=/boot/vmlinuz-2.4.9-e.12smp
    label=linux-Interact
    initrd=/boot/initrd-2.4.9-e.12smp.img
    read-only
    root=/dev/hda6
    append="console=tty1 console=ttyS0,19200n8 "
image=/boot/vmlinuz-2.4.9-e.12
    label=linux-up
    initrd=/boot/initrd-2.4.9-e.12.img
    read-only
    root=/dev/hda6
```

2. Run the **lilo** command to store and activate the LILO configuration.

When the Linux operating system starts, a `LILO boot:` prompt is displayed instead of the graphical user interface. Press Tab at this prompt to install all of the boot options that are listed. To load the operating system in interactive mode, type `linux-Interact` and then press Enter.

GRUB configuration: If you are using GRUB, complete the following steps to modify the /boot/grub/grub.conf file:

1. Comment out the `splashimage=` line by adding a `#` at the beginning of this line.
2. Add the following line before the first `title=` line:
   ```
   # This will allow you to only Monitor the OS boot via SOL
   ```
3. Append the following text to the first `title=` line:
   ```
   SOL Monitor
   ```
4. Append the following text to the `kernel/` line of the first `title=` section:
   ```
   console=ttyS0,19200 console=tty1
   ```
5. Add the following five lines between the two `title=` sections:
   ```
   # This will allow you to Interact with the OS boot via SOL
   title Red Hat Linux (2.4.9-e.12smp) SOL Interactive
       root (hd0,0)
   ```

```
kernel /vmlinuz-2.4.9-e.12smp ro root=/dev/hda6 console=tty1
    console=ttyS0,19200
    initrd /initrd-2.4.9-e.12smp.img
```

Note: The entry that begins with `kernel /vmlinuz` is shown with a line break after `console=tty1`. In your file, the entire entry must all be on one line.

The following examples show the original content of the /boot/grub/grub.conf file and the content of this file after modification.

Original /boot/grub/grub.conf contents

```
#grub.conf generated by anaconda
#
# Note that you do not have to rerun grub after making changes to this file
# NOTICE:  You have a /boot partition. This means that
#          all kernel and initrd paths are relative to /boot/, eg.
#          root (hd0,0)
#           kernel /vmlinuz-version ro root=/dev/hda6
#           initrd /initrd-version.img
#boot=/dev/hda
default=0
timeout=10
splashimage=(hd0,0)/grub/splash.xpm.gz
title Red Hat Enterprise Linux ES (2.4.9-e.12smp)
    root (hd0,0)
    kernel /vmlinuz-2.4.9-e.12smp ro root=/dev/hda6
    initrd /initrd-2.4.9-e.12smp.img
title Red Hat Enterprise Linux ES-up (2.4.9-e.12)
    root (hd0,0)
    kernel /vmlinuz-2.4.9-e.12 ro root=/dev/hda6
    initrd /initrd-2.4.9-e.12.img
```

Modified /boot/grub/grub.conf contents

```
#grub.conf generated by anaconda
#
# Note that you do not have to rerun grub after making changes to this file
# NOTICE: You have a /boot partition. This means that
#          all kernel and initrd paths are relative to /boot/, eg.
#          root (hd0,0)
#          kernel /vmlinuz-version ro root=/dev/hda6
#          initrd /initrd-version.img
#boot=/dev/hda
default=0
timeout=10
# splashimage=(hd0,0)/grub/splash.xpm.gz
# This will allow you to only Monitor the OS boot via SOL
title Red Hat Enterprise Linux ES (2.4.9-e.12smp) SOL Monitor
    root (hd0,0)
    kernel /vmlinuz-2.4.9-e.12smp ro root=/dev/hda6 console=ttyS0,19200 console=tty1
    initrd /initrd-2.4.9-e.12smp.img
# This will allow you to Interact with the OS boot via SOL
title Red Hat Linux (2.4.9-e.12smp) SOL Interactive
    root (hd0,0)
    kernel /vmlinuz-2.4.9-e.12smp ro root=/dev/hda6 console=tty1 console=ttyS0,19200
    initrd /initrd-2.4.9-e.12smp.img
title Red Hat Enterprise Linux ES-up (2.4.9-e.12)
    root (hd0,0)
    kernel /vmlinuz-2.4.9-e.12 ro root=/dev/hda6
    initrd /initrd-2.4.9-e.12.img
```

You must restart the Linux operating system after completing these procedures for the changes to take effect and to enable SOL.

SUSE SLES 8.0 configuration:

Note: This procedure is based on a default installation of SUSE Linux Enterprise Server (SLES) 8.0. The file names, structures, and commands might be different for other versions of SUSE LINUX.

Complete the following steps to configure the general Linux parameters for SOL operation when using the SLES 8.0 operating system.

Note: Hardware flow control prevents character loss during communication over a serial connection. You must enable it when using a Linux operating system.

1. Add the following line to the end of the `# getty-programs for the normal runlevels` section of the /etc/inittab file. This enables hardware flow control and enables users to log in through the SOL console.

   ```
   7:2345:respawn:/sbin/agetty -h ttyS0 19200 vt102
   ```

2. Add the following line after the `tty6` line at the bottom of the /etc/securetty file to enable a user to log in as the root user through the SOL console:

   ```
   ttyS0
   ```

3. Complete the following steps to modify the /boot/grub/menu.lst file:

a. Comment out the `gfxmenu` line by adding a `#` in front of the word `gfxmenu`.
b. Add the following line before the first `title` line:
```
# This will allow you to only Monitor the OS boot via SOL
```
c. Append the following text to the first `title` line:
```
SOL Monitor
```
d. Append the following text to the `kernel` line of the first `title` section:
```
console=ttyS0,19200 console=tty1
```
e. Add the following four lines between the first two `title` sections:
```
# This will allow you to Interact with the OS boot via SOL
title linux SOL Interactive
   kernel (hd0,1)/boot/vmlinuz root=/dev/hda2 acpi=oldboot vga=791
   console=tty1 console=ttyS0,19200
   initrd (hd0,1)/boot/initrd
```
The following examples show the original content of the /boot/grub/menu.lst file and the content of this file after modification.

Original /boot/grub/menu.lst contents	**Notes**

`gfxmanu (hd0,1)/boot/message`
`color white/blue black/light-gray`
`default 0`
`timeout 8`
 	
`title linux`
`  kernel (hd0,1)/boot/vmlinuz root=/dev/hda2 acpi=oldboot vga=791`
`  initrd (hd0,1)/boot/initrd`
`title floppy`
`  root`
`  chainloader +1`
`title failsafe`
`  kernal (hd0,1)/boot/vmlinuz.shipped root=/dev/hda2 ide=nodma apm=off vga=normal nosmp`
`disableapic maxcpus=0 3`
`  initrd (hd0,1)/boot/initrd.shipped`
	1
	
	1

Note 1: The kernel line is shown with a line break. In your file, the entire entry must all be on one line.	

Modified /boot/grub/menu.lst contents	**Notes**

`#gfxmanu (hd0,1)/boot/message`
`color white/blue black/light-gray`
`default 0`
`timeout 8`
 	
`# This will allow you to only Monitor the OS boot via SOL`
`title linux SOL Monitor`
`  kernel (hd0,1)/boot/vmlinuz root=/dev/hda2 acpi=oldboot vga=791 console=ttyS1,19200`
`console=tty1`
`  initrd (hd0,1)/boot/initrd`
`# This will allow you to Interact with the OS boot via SOL`
`title linux SOL Interactive`
` kernel (hd0,1)/boot/vmlinuz root=/dev/hda2 acpi=oldboot vga=791 console=tty1 console=ttyS0,19200`
` initrd (hd0,1)/boot/initrd`
`title floppy`
	1

Modified /boot/grub/menu.lst contents	Notes
root chainloader +1 title failsafe kernel (hd0,1)/boot/vmlinuz.shipped root=/dev/hda2 ide=nodma apm=off vga=normal nosmp disableapic maxcpus=0 3 initrd (hd0,1)/boot/initrd.shipped	1
Note 1: The kernel line is shown with a line break. In your file, the entire entry must all be on one line.	

You must restart the Linux operating system after completing these procedures for the changes to take effect and to enable SOL.

Microsoft Windows 2003 Standard Edition configuration

Note: This procedure is based on a default installation of the Microsoft Windows 2003 operating system.

Complete the following steps to configure the Windows 2003 operating system for SOL operation. You must be logged in as a user with administrator access to perform this procedure.

1. Complete the following steps to determine which boot entry ID to modify:
   a. Type `bootcfg` at a Windows command prompt; then, press Enter to display the current boot options for your server.
   b. In the `Boot Entries` section, locate the boot entry ID for the section with an OS friendly name of Windows Server 2003, Standard. Write down the boot entry ID for use in the next step.
2. To enable the Microsoft Windows Emergency Management System (EMS), at a Windows command prompt, type

   `bootcfg /EMS ON /PORT COM1 /BAUD 19200 /ID` *`boot_id`*

   where *boot_id* is the boot entry ID from step 1b; then, press Enter.
3. Complete the following steps to verify that the EMS console is redirected to the COM2 serial port:
   a. Type `bootcfg` at a Windows command prompt; then, press Enter to display the current boot options for your server.
   b. Verify the following changes to the bootcfg settings:
      - In the `Boot Loader Settings` section, make sure that `redirect` is set to `COM2` and that `redirectbaudrate` is set to `19200`.
      - In the `Boot Entries` section, make sure that the `OS Load Options:` line has `/redirect` appended to the end of it.

   The following examples show the original bootcfg program output and the output after modification.

Original bootcfg program output

```
Boot Loader Settings
----------------------------
timeout: 30
default: multi(0)disk(0)rdisk(0)partition(1)\WINDOWS
Boot Entries
----------------
Boot entry ID: 1
OS Friendly Name: Windows Server 2003, Standard
Path: multi(0)disk(0)rdisk(0)partition(1)\WINDOWS
OS Load Options: /fastdetect
```

Modified bootcfg program output

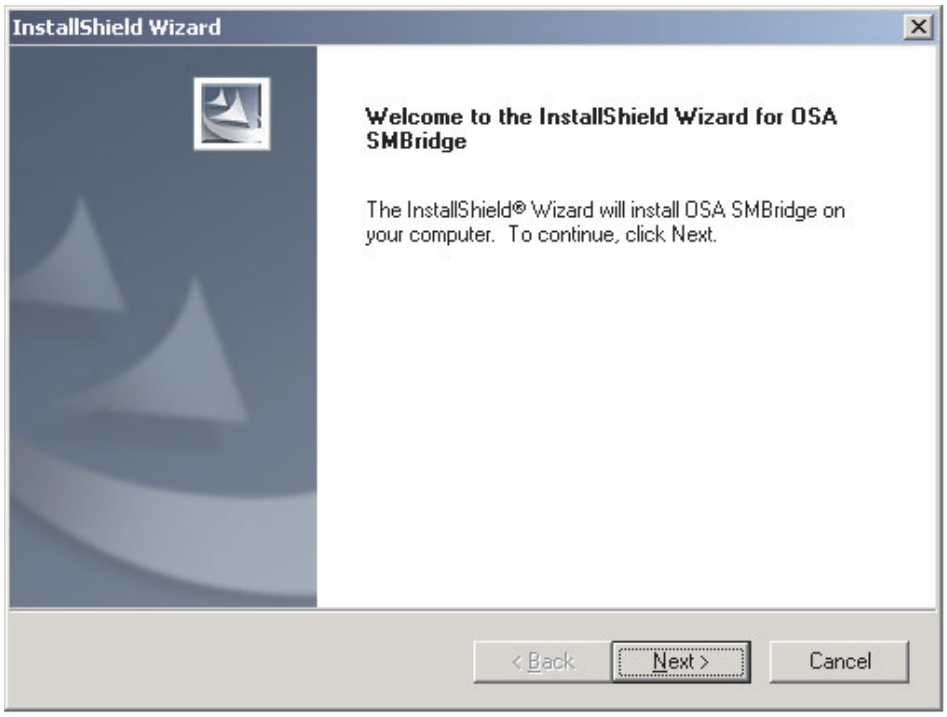
```
Boot Loader Settings
----------------------------
timeout: 30
default: multi(0)disk(0)rdisk(0)partition(1)\WINDOWS
redirect: COM1
redirectbaudrate: 19200
Boot Entries
----------------
Boot entry ID: 1
OS Friendly Name: Windows Server 2003, Standard
Path: multi(0)disk(0)rdisk(0)partition(1)\WINDOWS
OS Load Options: /fastdetect /redirect
```

You must restart the Windows 2003 operating system after completing this procedure for the changes to take effect and to enable SOL.

Installing the OSA SMBridge management utility program

Complete the following steps to install the OSA SMBridge management utility program on a server running a Windows operating system:

1. Go to http://www.ibm.com/support/ and download the utility program and create the OSA BMC Management Utility CD.
2. Insert the OSA BMC Management Utility CD into the drive. The InstallShield wizard starts, and a window similar to that shown in the following illustration opens.


InstallShield Wizard
Welcome to the InstallShield Wizard for OSA SMBridge
The InstallShield® Wizard will install OSA SMBridge on your computer. To continue, click Next.
< Back
Next >
Cancel

3. Follow the prompts to complete the installation.

   The installation program prompts you for a TCP/IP port number and an IP address. Specify an IP address, if you want to limit the connection requests that will be accepted by the utility program. To accept connections from any server, type `INADDR_ANY` as the IP address. Also specify the port number that the utility program will use. These values will be recorded in the smbridge.cfg file for the automatic startup of the utility program.

Complete the following steps to install the OSA SMBridge management utility program on a server running a Linux operating system. You must be logged in as a root user to perform these procedures.

1. Go to http://www.ibm.com/support/ and download the utility program and create the OSA BMC Management Utility CD.
2. Insert the OSA BMC Management Utility CD into the drive.
3. Type `mount/mnt/cdrom`.
4. Locate the directory where the installation RPM package is located and type `cd/mnt/cdrom`.
5. Type the following command to run the RPM package and start the installation:

   ```
   rpm -ivh smbridge-2.0-XX.rpm
   ```

6. Follow the prompts to complete the installation. When the installation is complete, the utility copies files to the following directories:

   /etc/init.d/SMBridge
   /etc/smbridge.cfg
   /usr/sbin/smbriged
   /var/log/smbridge/Liscense.txt
   /var/log/smbridge/Readme.txt

The utility starts automatically when the server is started. You can also locate the /ect/init.d directory to start the utility and use the following commands to manage the utility:

smbridge status
smbridge start
smbridge stop
smbridge restart

Using the baseboard management controller utility programs

Use the baseboard management controller utility programs to configure the baseboard management controller, download firmware updates and SDR/FRU updates, and remotely manage a network.

Using the baseboard management controller configuration utility program

Use the baseboard management controller configuration utility program to view or change the baseboard management controller configuration settings. You can also use the utility program to save the configuration to a file for use on multiple servers.

Complete the following steps to start the baseboard management controller configuration utility program:

1. Insert the configuration utility diskette into the diskette drive and restart the server.
2. From a command-line prompt, type `bmc_cfg` and press Enter.
3. Follow the instructions on the screen.

Using the baseboard management controller firmware update utility program

Use the baseboard management controller firmware update utility disk to update the baseboard management controller firmware and SDR/FRU data. The firmware update utility updates the baseboard management controller firmware and SDR/FRU data only and does not affect any device drivers.

Note: To ensure proper server operation, be sure to update the server baseboard management controller firmware before updating the BIOS code.

To update the firmware, if the Linux or Windows operating-system update package is available from the World Wide Web and you have obtained the applicable update package, follow the instructions that come with the update package.

Using the OSA SMBridge management utility program

Use the OSA SMBridge management utility program to remotely manage and configure a network. The utility program provides the following remote management capabilities:

- **CLI (command-line interface) mode**

  Use CLI mode to remotely perform power-management and system identification control functions over a LAN or serial port interface from a command-line interface. Use CLI mode also to remotely view the System Event/Error log.

  Use the following commands in CLI mode:

  – **identify**

    Control the system-locator LED on the front of the server.

  – **power**

    Turn the server on and off remotely.

  – **sel**

    Perform operations with the BMC System Event Log.

– **sysinfo**

  Display general system information that is related to the server and the baseboard management controller.

- **Serial over LAN**

  Use the Serial over LAN capability to remotely perform control and management functions over a Serial over LAN (SOL) network. You can also use SOL to remotely view and change the server BIOS settings.

  At a command prompt, type `Telnet localhost 623` to access the SOL network. Type `help` at the `smbridge>` prompt for more information.

  Use the following commands in an SOL session:

  – **connect**

    Connect to the LAN. Type `connect -ip` *`ip_address`* `-u` *`username`* `-p` *`password`*.

  – **identify**

    Control the system-locator LED on the front of the server.

  – **power**

    Turn the server on and off remotely.

  – **reboot**

    Force the server to restart.

  – **sel get**

    Display the System Event/Error log.

  – **sol**

    Configure the SOL function.

  – **sysinfo**

    Display system information that is related to the server and the globally unique identifier (GUID).

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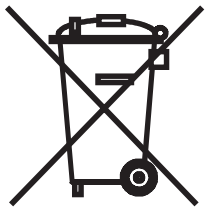

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This appliance is labeled in accordance with European Directive 2002/96/EC concerning waste electrical and electronic equipment (WEEE). The Directive determines the framework for the return and recycling of used appliances as applicable throughout the European Union. This label is applied to various products to indicate that the product is not to be thrown away, but rather reclaimed upon end of life per this Directive.

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この機器には、EU 諸国に対する廃電気電子機器指令 2002/96/EC(WEEE) のラベルが貼られています。この指令は、EU 諸国に適用する使用済み機器の回収とリサイクルの骨子を定めています。このラベルは、使用済みになった時に指令に従って適正な処理をする必要があることを知らせるために種々の製品に貼られています。

Remarque : Cette marque s'applique uniquement aux pays de l'Union Européenne et à la Norvège.

L'etiquette du système respecte la Directive européenne 2002/96/EC en matière de Déchets des Equipements Electriques et Electroniques (DEEE), qui détermine les dispositions de retour et de recyclage applicables aux systèmes utilisés à travers

l'Union européenne. Conformément à la directive, ladite étiquette précise que le produit sur lequel elle est apposée ne doit pas être jeté mais être récupéré en fin de vie.

In accordance with the European WEEE Directive, electrical and electronic equipment (EEE) is to be collected separately and to be reused, recycled, or recovered at end of life. Users of EEE with the WEEE marking per Annex IV of the WEEE Directive, as shown above, must not dispose of end of life EEE as unsorted municipal waste, but use the collection framework available to customers for the return, recycling, and recovery of WEEE. Customer participation is important to minimize any potential effects of EEE on the environment and human health due to the potential presence of hazardous substances in EEE. For proper collection and treatment, contact your local IBM representative.

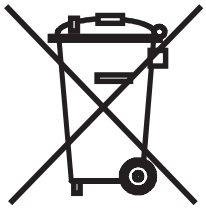
Battery return program

This product may contain a sealed lead acid, nickel cadmium, nickel metal hydride, lithium, or lithium ion battery. Consult your user manual or service manual for specific battery information. The battery must be recycled or disposed of properly. Recycling facilities may not be available in your area. For information on disposal of batteries outside the United States, go to http://www.ibm.com/ibm/environment/products/index.shtml or contact your local waste disposal facility.

In the United States, IBM has established a return process for reuse, recycling, or proper disposal of used IBM sealed lead acid, nickel cadmium, nickel metal hydride, and battery packs from IBM equipment. For information on proper disposal of these batteries, contact IBM at 1-800-426-4333. Have the IBM part number listed on the battery available prior to your call.

For Taiwan: Please recycle batteries.

For the European Union:



Notice: This mark applies only to countries within the European Union (EU).

Batteries or packaging for batteries are labeled in accordance with European Directive 2006/66/EC concerning batteries and accumulators and waste batteries and accumulators. The Directive determines the framework for the return and recycling of used batteries and accumulators as applicable throughout the European

Union. This label is applied to various batteries to indicate that the battery is not to be thrown away, but rather reclaimed upon end of life per this Directive.

Les batteries ou emballages pour batteries sont étiquetés conformément aux directives européennes 2006/66/EC, norme relative aux batteries et accumulateurs en usage et aux batteries et accumulateurs usés. Les directives déterminent la marche à suivre en vigueur dans l'Union Européenne pour le retour et le recyclage des batteries et accumulateurs usés. Cette étiquette est appliquée sur diverses batteries pour indiquer que la batterie ne doit pas être mise au rebut mais plutôt récupérée en fin de cycle de vie selon cette norme.

バッテリーあるいはバッテリー用のパッケージには、EU 諸国に対する廃電気電子機器指令 2006/66/EC のラベルが貼られています。この指令は、バッテリーと蓄電池、および廃棄バッテリーと蓄電池に関するものです。この指令は、使用済みバッテリーと蓄電池の回収とリサイクルの骨子を定めているもので、EU 諸国にわたって適用されます。このラベルは、使用済みになったときに指令に従って適正な処理をする必要があることを知らせるために種々のバッテリーに貼られています。

In accordance with the European Directive 2006/66/EC, batteries and accumulators are labeled to indicate that they are to be collected separately and recycled at end of life. The label on the battery may also include a chemical symbol for the metal concerned in the battery (Pb for lead, Hg for mercury, and Cd for cadmium). Users of batteries and accumulators must not dispose of batteries and accumulators as unsorted municipal waste, but use the collection framework available to customers for the return, recycling, and treatment of batteries and accumulators. Customer participation is important to minimize any potential effects of batteries and accumulators on the environment and human health due to the potential presence of hazardous substances. For proper collection and treatment, contact your local IBM representative.

This notice is provided in accordance with Royal Decree 106/2008 of Spain: The retail price of batteries, accumulators, and power cells includes the cost of the environmental management of their waste.

For California:

Perchlorate material – special handling may apply. See http://www.dtsc.ca.gov/hazardouswaste/perchlorate/.

The foregoing notice is provided in accordance with California Code of Regulations Title 22, Division 4.5 Chapter 33. Best Management Practices for Perchlorate Materials. This product/part may include a lithium manganese dioxide battery which contains a perchlorate substance.

Electronic emission notices

Federal Communications Commission (FCC) statement

Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio

communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his own expense.

Properly shielded and grounded cables and connectors must be used in order to meet FCC emission limits. IBM is not responsible for any radio or television interference caused by using other than recommended cables and connectors or by unauthorized changes or modifications to this equipment. Unauthorized changes or modifications could void the user's authority to operate the equipment.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Industry Canada Class A emission compliance statement

This Class A digital apparatus complies with Canadian ICES-003.

Avis de conformité à la réglementation d'Industrie Canada

Cet appareil numérique de la classe A est conforme à la norme NMB-003 du Canada.

Australia and New Zealand Class A statement

Attention: This is a Class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

United Kingdom telecommunications safety requirement

Notice to Customers

This apparatus is approved under approval number NS/G/1234/J/100003 for indirect connection to public telecommunication systems in the United Kingdom.

European Union EMC Directive conformance statement

This product is in conformity with the protection requirements of EU Council Directive 2004/108/EC on the approximation of the laws of the Member States relating to electromagnetic compatibility. IBM cannot accept responsibility for any failure to satisfy the protection requirements resulting from a nonrecommended modification of the product, including the fitting of non-IBM option cards.

This product has been tested and found to comply with the limits for Class A Information Technology Equipment according to CISPR 22/European Standard EN 55022. The limits for Class A equipment were derived for commercial and industrial environments to provide reasonable protection against interference with licensed communication equipment.

Attention: This is a Class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

European Community contact:
IBM Technical Regulations
Pascalstr. 100, Stuttgart, Germany 70569

Telephone: 0049 (0)711 785 1176
Fax: 0049 (0)711 785 1283
E-mail: tjahn@de.ibm.com

Taiwanese Class A warning statement

警告使用者:
這是甲類的資訊產品，在
居住的環境中使用時，可
能會造成射頻干擾，在這
種情況下，使用者會被要
求採取某些適當的對策。

Chinese Class A warning statement

声　　明
此为 A 级产品。在生活环境中，
该产品可能会造成无线电干扰。
在这种情况下，可能需要用户对其
干扰采取切实可行的措施。

Japanese Voluntary Control Council for Interference (VCCI) statement

この装置は、情報処理装置等電波障害自主規制協議会（ＶＣＣＩ）の基準に
基づくクラスＡ情報技術装置です。この装置を家庭環境で使用すると電波妨害を
引き起こすことがあります。この場合には使用者が適切な対策を講ずるよう要求
されることがあります。

Korean Class A warning statement

이기기는 업무용으로 전자파 적합등록을 받은 기기
이오니, 판매자 또는 사용자는 이점을 주의하시기
바라며, 만약 잘못 구입하셨을 때에는 구입한 곳에
서 비업무용으로 교환하시기 바랍니다.

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Part Number: 44W2584

Printed in USA

(1P) P/N: 44W2584